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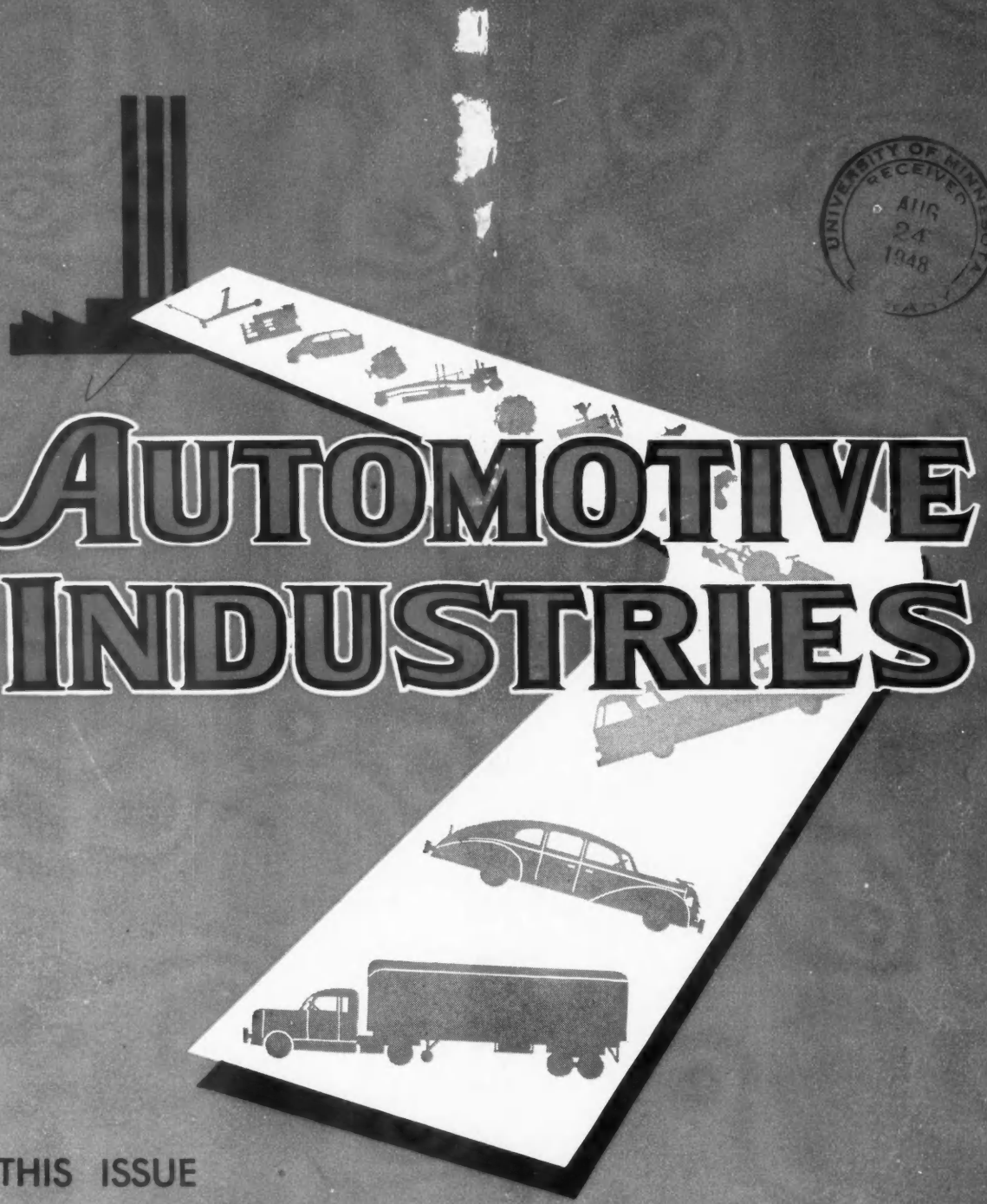

AUTOMOTIVE INDUSTRIES

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An Analysis of Vee Type 6-Cylinder Engines

Plaster Molds for Making Dynaflow Parts at Allison-Bedford

New Swiss Thin-Split-Sleeve Engine

Federal's New Diesel and Six Wheel Trucks

Labor's Next Battle Ground

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NEW HEALD BORE-MATICS BOOST PRODUCTION 167%

...and Manufacturer Gets Lower Costs—Higher Quality Product—Finer Finish

Here's another example of how manufacturers are reducing costs—improving quality with the new Heald Bore-Matics.

After replacing the slow, fatiguing equipment previously used by new, fast, easy-to-operate Bore-Matics, a valve manufacturer was able to increase production 167%! Besides this big saving in direct costs, finish was greatly improved, permitting the elimination of an inspection operation before assembly.

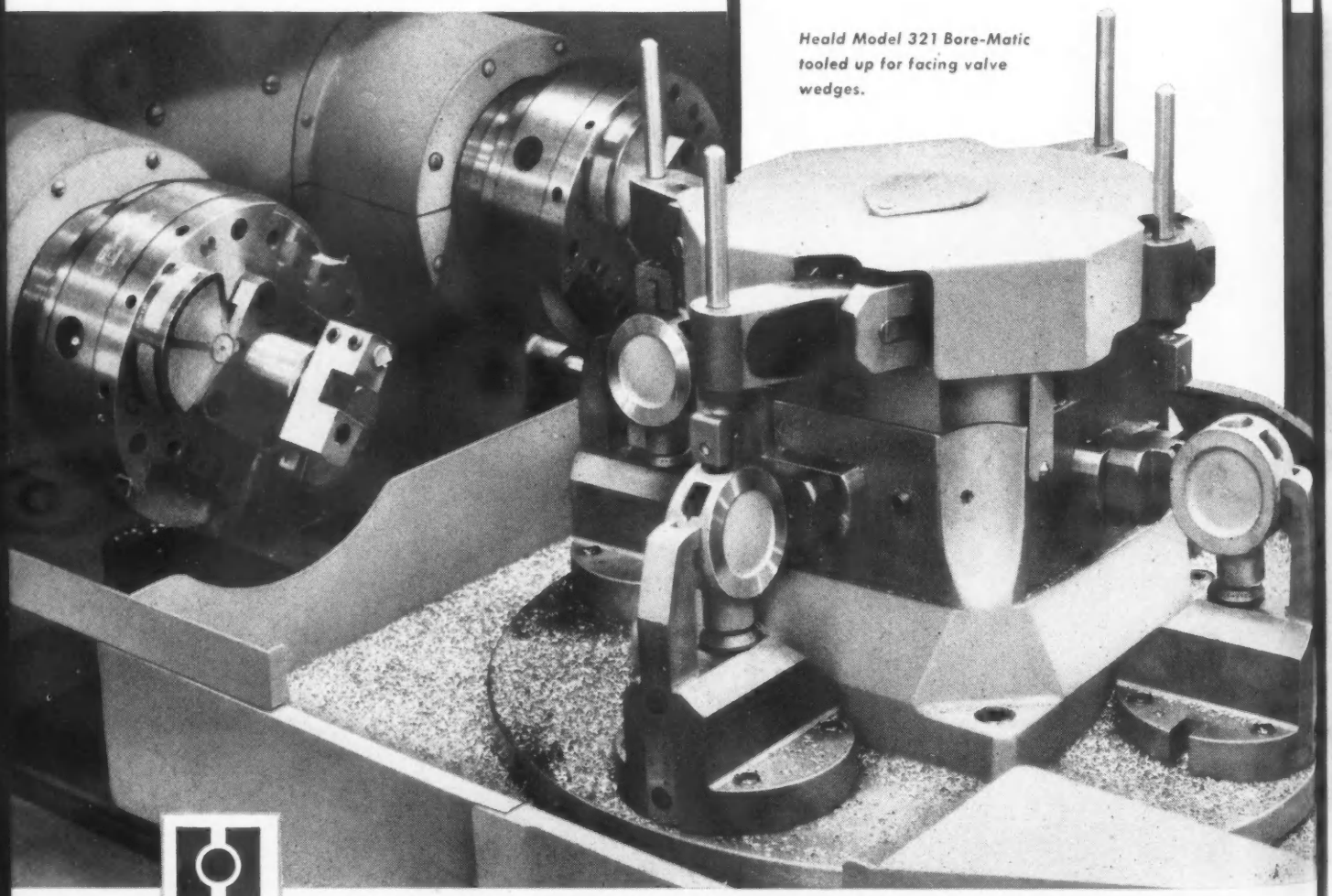
Both valve wedges and bodies are borized—the setup below illustrating the facing operation on wedges. Opposite faces are finished simultaneously by two boringheads with cross feed units. Fixture has four stations permitting loading during the facing operations.

These new Heald Bore-Matics offer the same opportunity for lowering *your costs*—whatever you manufacture. For complete information, contact your nearest Heald representative, or call on us here at Worcester.

IMPROVE YOUR PRODUCT— LOWER YOUR COSTS—

with these New Bore-Matic features

As in this installation, you too can improve product quality, increase production and cut costs by finishing parts on Heald Bore-Matics. Such features as—faster table traverse—higher speeds—quicker starting and stopping—constant feeds—low temperature hydraulic system—ventilated base and bridges—cool running heads—perfected way lubrication—universal valve manifold—leakproof piping, and many more—can save you time and money . . . they're worth investigating.



Heald Model 321 Bore-Matic tooled up for facing valve wedges.

HEALD

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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

August 15, 1948 Vol. 99, No. 4

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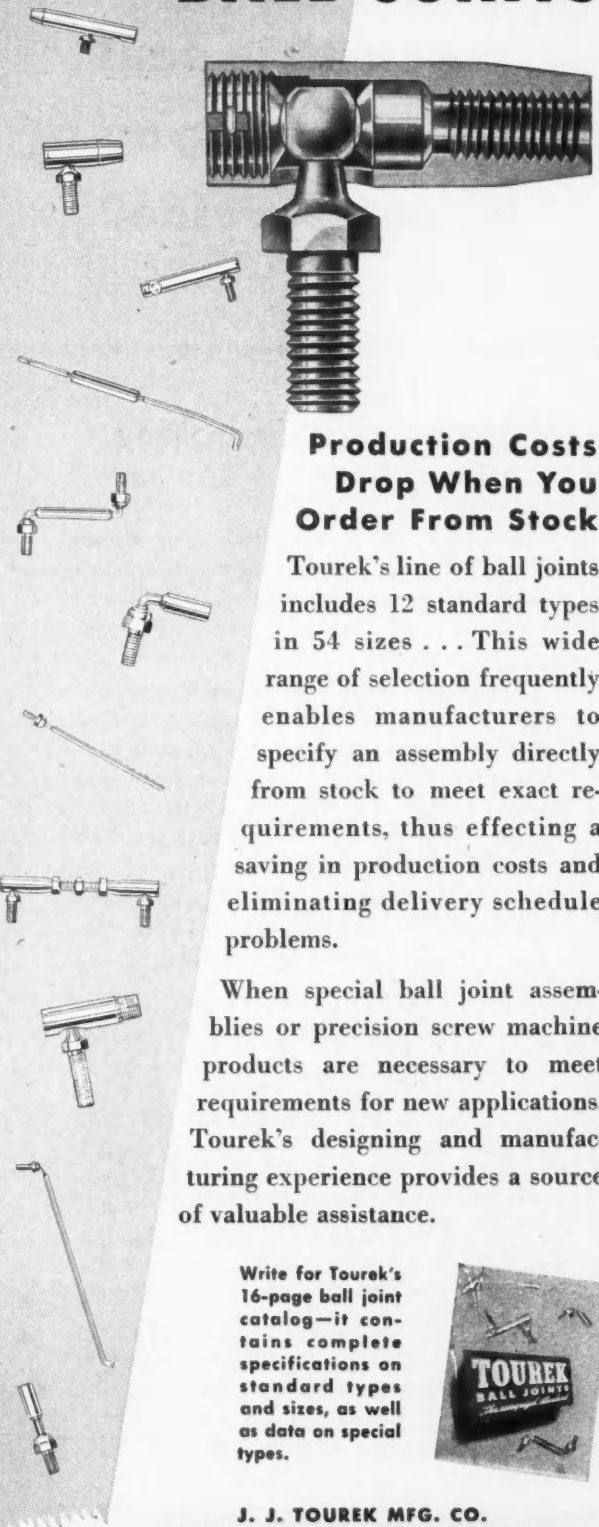
TOUREK BALL JOINTS



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4701 W. 16th Street, Chicago 50, Illinois

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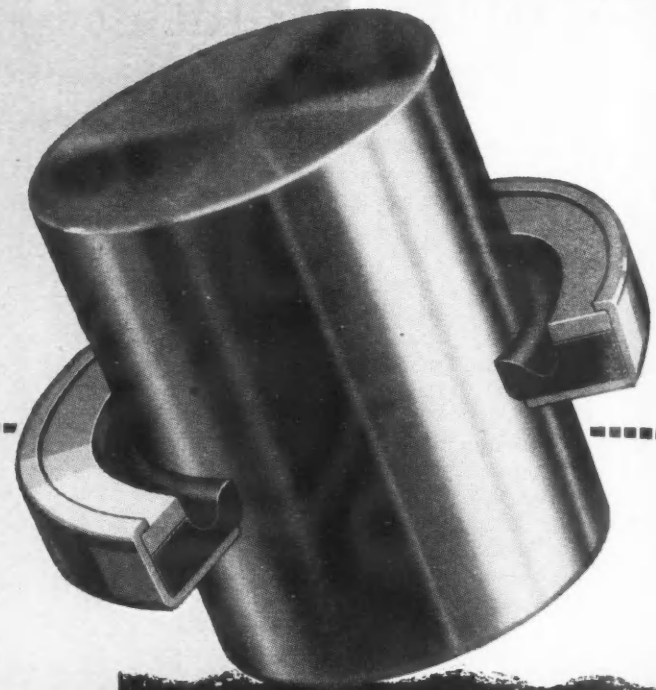

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(NARROW WIDTH)

How Victor Seal-ology gives the right answer

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Seal-ology, as developed in Victor Research Laboratories, is the most scientific method of pre-determining oil seal performance. Step by step, it gives recognition to all factors of application in their logical order. Then it carefully provides for each condition in proper balance.

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Intermittent Operation	225 deg. F.
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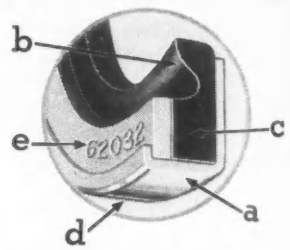

a Designed to narrow width, fits easily where space is limited axially or radially.

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e Permanent identification with catalog number makes replacement easier.

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For standard uses, Victor offers a wide selection of Seal-ology-*proved Victoprene seals. Write on your letterhead for Catalog 304 which includes complete technical data. No obligation.*

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

An Old Technique Molds Difficult Parts

Casting intricately cored parts of the Buick Dynaflow transmission is far from simple. This fascinating article describes the production of aluminum torque converter castings by the Antioch plaster mold process in which the Allen-Bedford Foundry of General Motors specializes. It begins on page 28.

Is the Aircraft Industry Labor's Next Battleground?

The aircraft industry's optimism toward emerging in 1952 as a profit industry has been tempered by higher union wage demands and costly work stoppages. The "third round" has hit the industry full force. This article by author Robert McLarren starts on page 31.

Vee-Type and Flat Six-Cylinder Engines

Interest in six-cylinder Vee engines for passenger cars results from a movement toward higher compression ratios. This article analyses limitations of the Vee six in reference to uniform expolsions, and freedom from shaking forces and rocking couples. Facts are on page 32.

Measuring Engine Torque Under Driving Conditions

The experimental engineering department of Kaiser-Frazer Corp. has developed an instrument for measuring torque of an automobile engine on the road. Claimed more accurate and practical for torque tests than a dynamometer in a laboratory, this new torquemeter is described with charts of tests, on page 35.

New Series SSV Engine Features Thin Split Sleeve

The smaller of two new engines produced by the S.R.O. Ball Bearing Co., Switzerland, has run 300 hours without dismounting in bench tests, developing 43 hp at 5000 rpm. Characterized by a thin lightweight fully split sleeve with a rectangular movement and a stroke of only 0.433 in., its details appear on page 43.

23 New Product Items And Other High Spots, Such As:

An editorial on the effectiveness of the Taft-Hartley Law; a special design British oil-controlled marine reverse-reduction gear; the Road Show of 1948; Federal's new Diesel and six-wheel trucks; shipments of steel to automobile industries in the years '41, '46, and '47; information on the new Lancia truck; and an account of high speed machining of crankshafts at Cadillac.

News of the Automotive Industries, Page 17
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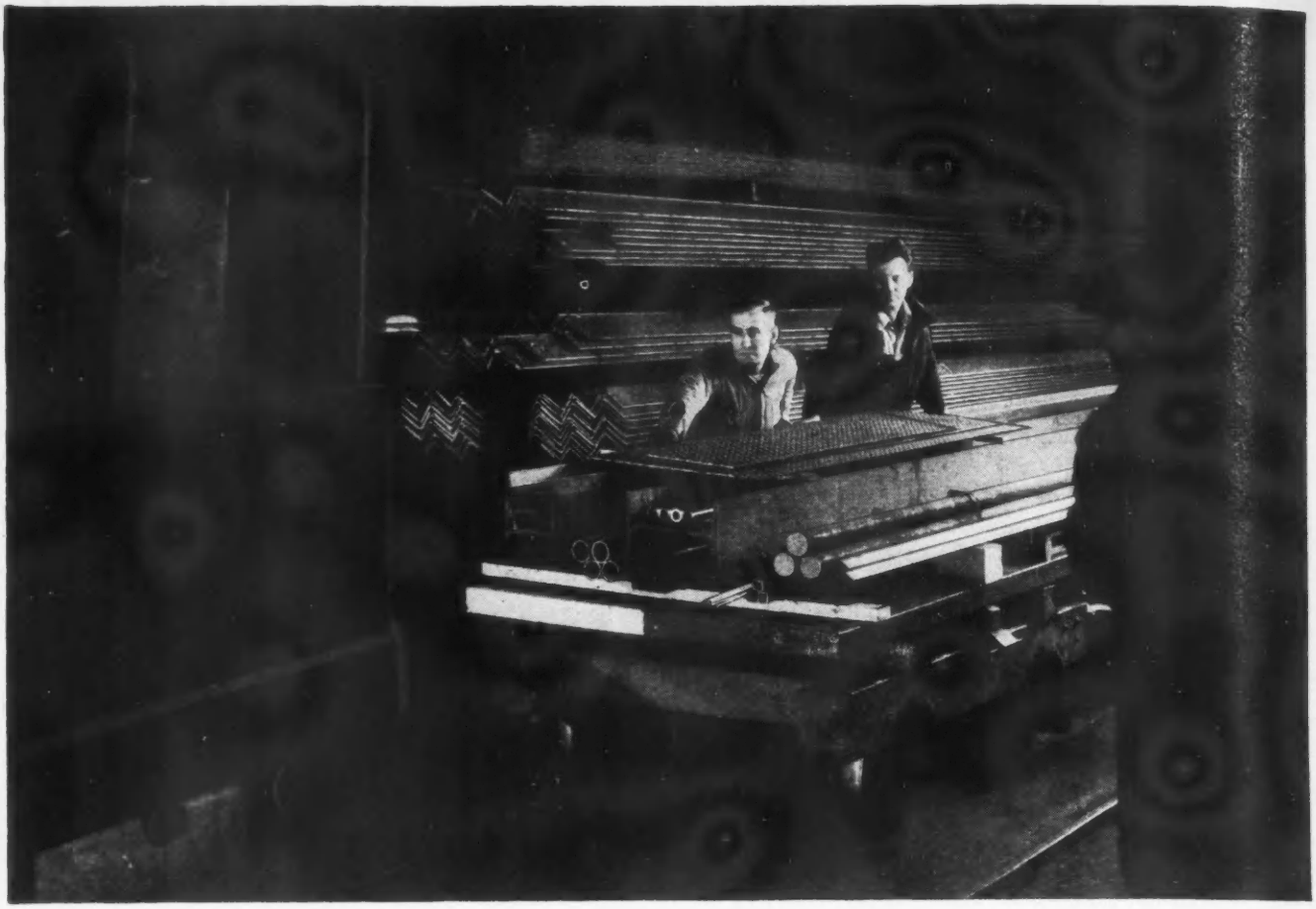

Steel Hard to Get?

Demand Still Exceeds Supply But . . .

. . . this is a typical view of night loading operations at a Ryerson steel-service plant. The steels specified on several orders are on their way to a loading platform for delivery the following morning. Possibly none of these orders are completely filled—however, the fact remains, we are doing our very best to serve a large group of steel users.

Unfortunately, it often seems that the particular steel *you* want is never on hand, and it is true that we are always short of some kinds and sizes. But our stocks turn over fast. A size that is out today may be in tomorrow. And in spite of current conditions, we still believe the over-all stocks at our thirteen plants are the nation's largest.

Carbon and alloy steels, hot rolled or cold finished, and stainless steel in practically every analysis and finish are in stock, ready for your call. So do not hesitate to get in touch with us —on any requirement. You'll find that every Ryerson steel man will do everything possible to help you get the steel you need, when you need it.

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RYERSON STEEL

NEWS of the AUTOMOTIVE INDUSTRIES

Vol. 99, No. 4 August 15, 1948

July Good Production Month; August Prospects Dim

The familiar up-and-down pattern in automobile production still prevails. July was a good production month with just under 500,000 vehicles produced, the second highest postwar month, being exceeded only by last March when output reached 515,000. However, prospects for August are not good. At the beginning of the month, some automotive assembly plants were closed down because of supplier strikes and others were living on borrowed time in hopes that the strikes would be settled. Principal stumbling block was the stoppage at Campbell-Wyatt & Cannon foundry at Muskegon, Mich. which supplies camshafts, engine blocks, and other compenents to most of the industry. Another troublesome strike was at Timken-Detroit Axle Co. which affected truck producers. It is believed now that production this month will not exceed 420,000 vehicles and if the strikes continue will be considerably below that.

Canadian Car Excise Tax Reduced by 15%

The Canadian government has reduced the 25 per cent excise tax on automobiles by 15 per cent to the 10 per cent rate which applied last November. Lifting of the tax is part of the government's program to gradually ease restrictions imposed several months ago to conserve dollar imports. It is not known, however, whether the Canadian officials will relax the ban on import of complete automotive vehicles or modify the import quota on parts from the United States. As a result of reducing the excise tax, Ford Motor Co. of Canada, Ltd. has reduced retail prices ranging from $177 on the Ford DeLuxe business coupe to $363 on the Monarch sedan. Although the 25 per cent tax undoubtedly priced some buyers out of the market, the company has still been able to sell all cars produced and is far behind in its deliveries.

GM and Ford Hike Prices

General Motors was finally forced to fall in line with a price increase late in July amounting to about eight percent on passenger cars. Truck prices, however, were not affected. It is believed that GM may be able to hold the line now until the new models appear. Because of rising costs of materials and labor, plus lower volume production than expected the Ford Motor Co. has raised prices $75 a car or about five per cent on all model Fords except the six-passenger business coupe which was reduced $5. The reduction on the latter model brings it $2 under the cheapest Chevrolet model. Dealers will get their traditional discount on the increase. At the same time prices on the Lincoln and Mercury were raised 5.3 per cent. Prices of the station wagon are under study and will be announced later.

TWO IN ONE

Tested recently, the Aerocar is said to have a top air speed of 109 mph and a designed road speed of 60 mph. Made by Aerocar Inc., Longview, Wash., it has a 29 ft wing span, and a length, as an airplane, of 21 ft; its height as a car, overall, is 5 ft 4 in., and length is 10 ft, 4 in. It is powered by a Franklin 225 engine, developing about 110 hp.

Kelsey-Hayes Buys Plant For East Coast Deliveries

The Kelsey-Hayes Wheel Co. has purchased a plant at McKeesport, Pa. from the Jones & Laughlin Steel Corp. Although it had been reported that Kelsey-Hayes was seeking a plant in the Pittsburgh area primarily because of the FOB pricing on steel, a spokesman said that the company had planned to move to Pittsburgh as early as 1938. He said that a plant there would facilitate shipment of products to East Coast customers. The McKeesport plant includes 25 acres with 28 buildings. Employment there is expected to total 1500 eventually.

Packard Makes Comeback With $6 Million Profit

The Packard Motor Car Co., after a rather difficult postwar start, is doing very well financially at present. Earnings during the first six months of this year were the highest for any corresponding period in any year since 1937. Net profit for the second quarter of this year totaled $4,909,078, compared with $1,304,727 for the first quarter, bringing the combined six months net income to $6,213,805 after taxes. For the first six months of 1947, the company reported a consolidated net loss of $1,872,634 before carryback adjustments. The company produced 462,000 cars during the first half of 1948, compared with 55,477 units in all of 1947.

Bendix Reported Developing Small Truck Power Brake

The Bendix Aviation Corp. is reported to have under development a power brake for light trucks. A spokesman indicated that the new brake will be aimed at lower operating costs and easier installation and implied that the problems of high cost and complicated installation have been overcome.

Engineering Library

NEWS *of the* AUTOMOTIVE INDUSTRIES

Ford and UAW-CIO Agree on 13c an Hour Boost

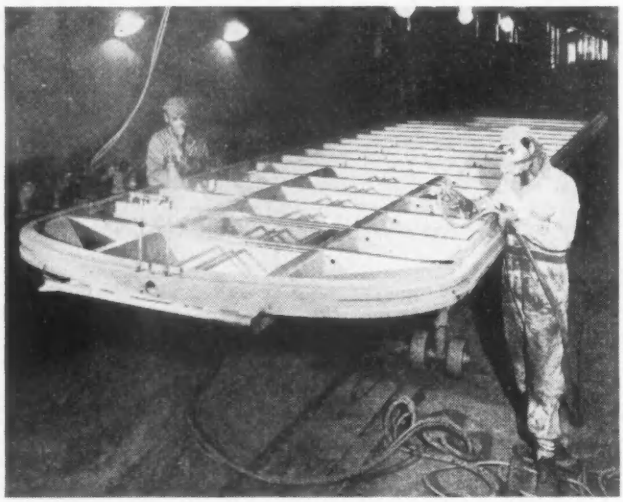
An important feature of the settlement between the Ford Motor Co. and the UAW-CIO was an agreement that the union would not seek "overtime on overtime" pay based on a recent decision of the United States Supreme Court. The company also successfully resisted the union's demand that Ford pay the entire cost of its group insurance plan, and that the plan be administered jointly by the union and the company. The union succeeded, however, in winning a one-year contract, rather than a two-year agreement, reopenable only once on the wage question. Pay increases agreed on had no special significance since the 13 cents an hour raise granted was similar to that given by other automobile companies. Afternoon and midnight shifts premiums were increased two and five cents respectively, and vacation benefits were liberalized. Settlement with Ford makes the third round in the automobile industry unanimous. Ford has also granted increases to salaried personnel ranging from $20 to $50 a month to employes receiving up to $625 a month.

New Chrysler Model Tooling 5 Times Prewar Cost

Cost of tools, dies, and equipment for bringing out the new line of Chrysler models will total $75 million. That figure is five times the amount a similar program would have cost before the war, according to K. T. Keller, president. Although no definite time has been announced for introducing the 1949 models, it is believed they will not appear until early next year. At a press conference recently Mr. Keller said that recent increases in costs of materials will quite possibly lead to still higher prices for cars and trucks.

General Motors Plans Show of New Line in N. Y.

GM is understood to be planning a public showing of its complete line of 1949 models in New York in mid-January. Space has been reserved, according to reports, but it is not yet clear whether the showing will be the first public announcement of the new models. Belief in Detroit, however, is that the various divisions will introduce new models individually before that time, and that the New York show will be a climax featuring all of the company's new offerings.



ZINC SKIN

Using Zincilate, a zinc-base liquid which dries into a film of hard, smooth zinc, the Trailmobile Co. is now "Weather Plating" its trailers for protection against rust and corrosion. Trailmobile reports that metal test samples coated with the same zinc-base pigment used in "Weather Plating" Trailmobile trailers have been exposed under test conditions for 1000 hr without failure.

Ford Changes System of Parts Pricing

Ford has changed over to a net pricing system on repair parts, but has not altered its discount structure. Formerly, prices were quoted with a symbol to indicate the discount structure to various classes of the trade. The company has also raised Ford, Lincoln, Mercury, and tractor parts prices on about 4000 items in the line an average of nine per cent. No change has been made in the distribution setup, with about 500 dealers acting as wholesalers to the independent repair trade. Wholesaling dealers must meet certain requirements to service the trade before they are classed as wholesalers and eligible for the wholesale discount.

Industry to Fete Building of 100 Millionth Vehicle

Latest word on the celebration by the automobile industry to commemorate the building of the 100 millionth vehicle is that it will be held in November instead of October as previously planned. The reason for the postponement is to avoid political complications during election year. Tentative plans now call for local celebrations under sponsorship of state automobile dealer's associations between Nov. 3 and 17, and to wind up with an industry dinner in Detroit, Nov. 18.

Studebaker Net Income Doubles 1947 Half

Net income earned by Studebaker Corp. for the first six months of this year was more than double the earnings for the same period a year ago. Net income for the period was $8,126,554, compared with $3,587,978 for the first half of 1947. During the first half of this year the company sold 114,338 cars and trucks, compared with 94,472 in the same period of last year.

Diamond T Take-off Fender Makes Engine Accessible

The Diamond T Motor Car Co. has announced a new feature to greatly improve ease of engine servicing. Front fenders are now designed so that the entire assembly—fenders, shield, braces, and headlights—can be completely removed in five to seven minutes, eliminating the greatest single obstacle to engine accessibility.

New Model Work Resumes After Tool Strike Ends

Tool and die workers in Detroit returned to work July 21 after a five-week strike. It is believed that the walkout affected new model work to some extent, but will not seriously delay introduction of new models since both GM and Chrysler had been delayed somewhat from their original plans before the strike occurred.

Government to Put Plants In Stand-by Condition

Acting under authority from the National Industrial Reserve Act, the federal works agency is expecting to take over and put into standby condition about 60 government-owned plants duing the next year. The agency will take over, repair, maintain, and preserve specialized former war plants and machine tools in such condition that they could be utilized quickly in case of war.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Ferguson Plans Output of Tractors in October

Production of the new Ferguson tractor by Harry Ferguson, Inc. will begin in October. The company took possession of its new plant in the western outskirts of Detroit July 29. The plant covers 170,000 sq ft and is located on a 72-acre site. An administration building and research laboratory will be built later. Machinery and equipment are being installed, and when completed will represent an investment of $5 million. In addition, suppliers are said to be investing another $5 million to provide facilities for building components for the Ferguson tractor. Production goals are 100 a day by Dec. 1; 150 daily by March 1; and 250 a day by next summer. Maximum capacity of the plant on two shifts will be 500 units a day. The tractor will be powered with an engine developed and manufactured specifically by Continental Motors Corp. Other suppliers include GM, Borg-Warner, Kelsey-Hayes, and Bendix Aviation.

K-F Second Quarter Net Increases 70 Per Cent

The Kaiser-Frazer Corp. is doing much better financially than early this year. Net profit for the second quarter was $3.9 million, 70 per cent greater than the earnings of $2.3 million the first three months of 1948, bringing income after taxes for the first half to $6,240,000. During the first half of 1947 the company had a loss of more than $2 million, but ended the year with a net profit of approximately $19 million.

Engine Shipments Indicate Pickup in Small Planes

Heaviest shipments of small aircraft engines by Continental Motors since April of 1947 indicate an improvement in the personal airplane industry, according to C. J. Reese, president. Shipment of 22,532 engines of all types made by the company made June the largest month since V-J day.

Army to Test Lubricant Under Heat and Cold

An extensive test of Army trucks in extremes of heat and cold is now underway by a convoy of several 2½-ton trucks. New all-weather lubricants developed by the Army will be tested under temperatures ranging from 50 degrees below zero to 100 degrees above. The test will start in the southwestern states and in the California deserts, and then will move northward to Great Falls, Montana and thence on to the Alcan Highway. The trucks will operate from November until February in Alaska and return to the U.S. next spring.

Army's Air-Cooled Engine Seen as Commercial Unit

Adoption by the Army of the new line of air-cooled engines for military vehicles is considered a likely initial step toward adoption of this type power plant in commercial trucks and buses. It is known that Continental Motors Corp. has worked with the Army developing the new type engines, and it is a likely prospect that when the company gets into production for the military services, extension of the engines to commercial use may be a logical development. The engines are in various sizes ranging from 100 to 1040 hp and have definite advantages which would make them desirable for truck and bus use.

Chance Vought Moving Plant to Dallas

The Chance Vought Div. of United Aircraft Corp. has started removal of its plant from Stratford, Conn. to Dallas, Tex. The operation will require movement of 30,000 tons of machinery, and the migration of at least 1500 families to the Texas area. Total cost is expected to be about $6 million. Reasons for the move are to improve production and flying facilities, lower maintenance costs, and reduce vulnerability to enemy bombing in case of war.

Ward Named Manager of Ford Parts Unit

Earl C. Ward has been made general manager of the new parts and accessory division of Ford Motor Co. He was formerly vice president, comptroller, and director of Montgomery Ward & Co.

Nash Assembly Lines Down for 1949 Model Changeover

The Nash assembly line at Kenosha, Wisc. is down this month in preparation for production of 1949 models. Assembly of the new models will start early in September. Production departments, however, started producing parts during the first week in August.

Ford Extending Adoption of Powdered Metal Parts

The Ford Motor Co. reports that it is using powdered metal parts much more extensively in its 1949 models than ever before. Parts now made with powdered metal include bushings and pistons in the shock absorbers, steering assembly bushings, generators and starter bushings, clutch cross shaft bearing and pilot bearing, distributor bushing, clips and bushings in windshield assembly, oil and water pump bushings, and bushings in all small electric blower motors in the air-conditioning system and in various accessories.

1948 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total 1948	Total 1947
January	305,081	99,200	1,370	405,651	347,696
February	274,847	107,054	1,090	382,991	373,360
March	349,998	140,606	1,409	492,013	421,180
April	308,071	128,963	1,048	438,082	423,399
May	225,461	111,789	1,281	338,531	382,640
June	312,406	117,572	1,055	431,033	400,372
Total—6 Months	1,775,864	705,184	7,253	2,488,301	2,348,647

1948 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	285,373	19,708	83,893	15,307	1,068	302
February	256,753	18,094	88,889	18,165	752	338
March	327,198	22,800	118,572	22,034	1,202	207
April	288,356	19,715	111,911	17,052	902	146
May	209,591	15,870	96,909	14,880	1,161	120
June	293,582	18,824	101,755	15,817	879	176
Total	1,660,853	115,011	601,929	103,255	5,964	1,289

* Automobile Manufacturers Association.

NEWS *of the* AUTOMOTIVE INDUSTRIES

FACE LIFTED CROSLEY

Currently being displayed throughout the country, new Crosleys have a "new look" grille treatment which features a chrome spinner and arrow-shaped louvres. Powered by the 26.5 hp Crosley engine, the car is 145 in. long, 49 in. wide, and 57 in. high.

Goodyear Producing Airfoam In New Akron Plant

Producing Airfoam cushioning for automotive seating and for the furniture and mattress industries, what is reportedly the world's largest continuous production line for foamed rubber has been placed in operation by the Goodyear Tire & Rubber Co. in Akron, O. at a new plant. The operations represent an outlay of over $5 million in building and equipment, E. J. Thomas, Goodyear president stated.

Ford Builds Addition to Open Hearth

The Ford Motor Co. has begun work on an addition, which it is expected will be finished in October, to its open hearth building at the Rouge plant. To be 100 ft in length and 170 ft in width, the addition is being built to improve hot metal handling facilities, enlarge railroad trackage, increase storage area, and make room for a new hot metal crane.

Socony Grants $250,000 to MIT for Atomic Research

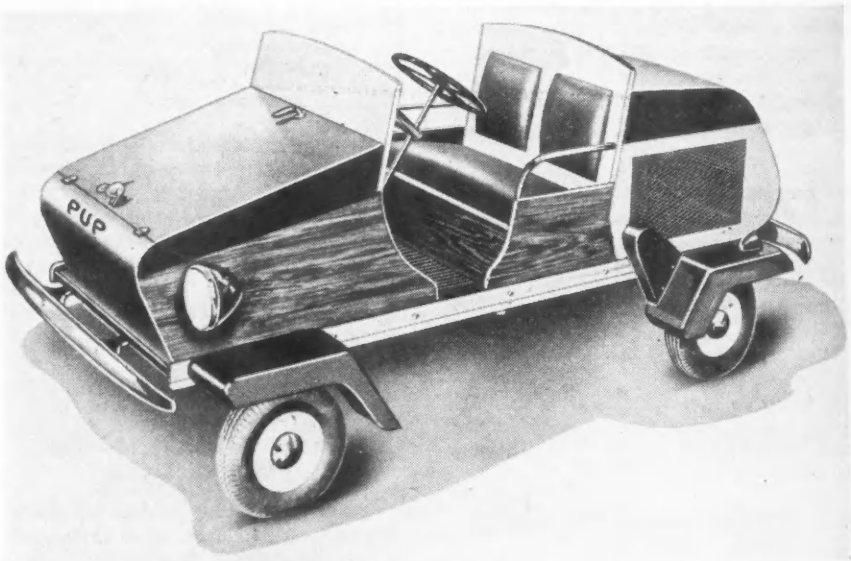
The Socony-Vacuum Oil Co., Inc., has granted $250,000 to the Massachusetts Institute of Technology, Cambridge, Mass., for basic studies of nuclear fission and its engineering. The grant will be made at the rate of $50,000 a year for five years. Closely related to the ultimate nature of matter and energy, this work will be carried on principally in the M.I.T. laboratory for nuclear science and engineering, which is coordinated with the Institute's physics, chemistry, metallurgy, biology and chemical, electrical and mechanical engineering departments.

To Make 3-Wheel Delivery Unit in Oxford, N. C.

The production of Thrif-T, a three-wheel automotive delivery unit, with 500 lb carrying capacity, will start next month in the three-story plant of the Tri-Wheel Motor Corp., in Oxford, N. C., C. D. Gill, president, stated recently. The Thrif-T is powered by an air-cooled, two-cyl opposed engine developing 7.2 hp at 1800 rpm and over 10 hp at 3000 rpm. With 25 units planned for August, Mr. Gill said that production would be stepped up by 50 to 100 units a month for the remainder of the year, with 500 units a month planned by the start of 1949. The Thrif-T features a single front wheel, and its overall length is 126 in.; width, 53 in.; wheelbase, 85 in.; and weight, 900 lb. It has a top speed of about 40 mph, and gives 40 to 50 mpg, it is claimed. Four body models will be offered at the following prices, all FOB, Oxford, N. C.: Pick-Up $745; Closed Delivery Deck $760; Three-Passenger Commercial, $775; and High-Boy, $785.

Produce Prototype of New British "Minicar'

The prototype of the first British "minicar", a tiny, all-aluminum automobile, which weighs less than 200 lb and which has a maximum speed of 40 mph, has been made by the Bond Aircraft and Engineering Co.



PUP PROPULSION

A two-passenger automobile, the Pup, produced by the Pup Motor Co., Inc., Milwaukee, Wisc., features an automatic clutch and a rear mounted engine. Either a one-cyl 7.5-hp model or air-cooled, two-cyl, 10-hp model is available. Weighing about 600 lb, the Pup is 8.5 ft long, 4 ft wide, and has a 6 ft wheelbase. It is expected that deliveries will start in the fall.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Kellet Studies USAF Jet Helicopter

The Kellett Aircraft Corp. has disclosed that it has been granted a design study contract by the USAF for the development of a jet helicopter to be designated the XH-17.

British Truck Show in London, Oct. 1-9

The first automobile show to be held in England since before the war will be an exhibition of trucks, trailers, buses and other utility vehicles at the International Commercial Motor Transport Exhibition to be held in London, from Oct. 1-9. Of the 420 manufacturers exhibiting, 48 are chassis manufacturers, 56 body builders, 14 trailer manufacturers, 14 tire makers, and over 200 accessory and equipment producers. Chevrolet, Dodge, Ford, Studebaker and Reo are among the American truck makers exhibiting. The British truck show will be followed by the annual Paris display, for all types of vehicles, from Oct. 7-17, and England will stage a second show for passenger cars only from Oct. 26-Nov. 6.

GM Grooms Light Weight Diesel

One of the interesting exhibits at the show held by the American Road Builders' Association at Chicago last month was an experimental model of an entirely new heavy-duty Diesel engine being groomed by Detroit Diesel Engine Div., General Motors corp., for production later this year or possibly in January. This engine is presumably of the same basic design as the well-known "71" series engines. It will be known as the "110" model, and will have a displacement of 110 cu. in. per cylinder. At the present writing, the engine will be built only as a six-cyl model for installation in trucks and buses, and certain types of industrial equipment.

An unusual feature of the "110" is the use of aluminum for the major parts of its structure, including cylinder heads, cylinder block, blower housing, etc. It is understood that although the engine will have considerably greater output than the 6-71, possibly 280 hp, its weight will be about the same. Another noteworthy feature evident in the show engine is the adoption of a centrifugal blower instead of the lobed rotor type used for the "71" line of models.

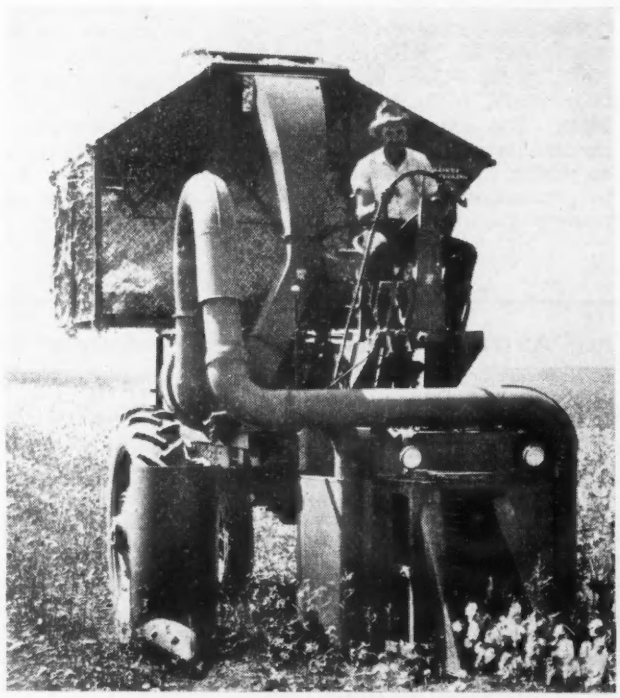
Detroit Diesel also announced the addition of a torque converter to its engine line. The cut-away model at the show indicates that this mechanism has two stator elements which are free to rotate in direct drive when the unit functions as a fluid coupling.

TALLER CRAWLER

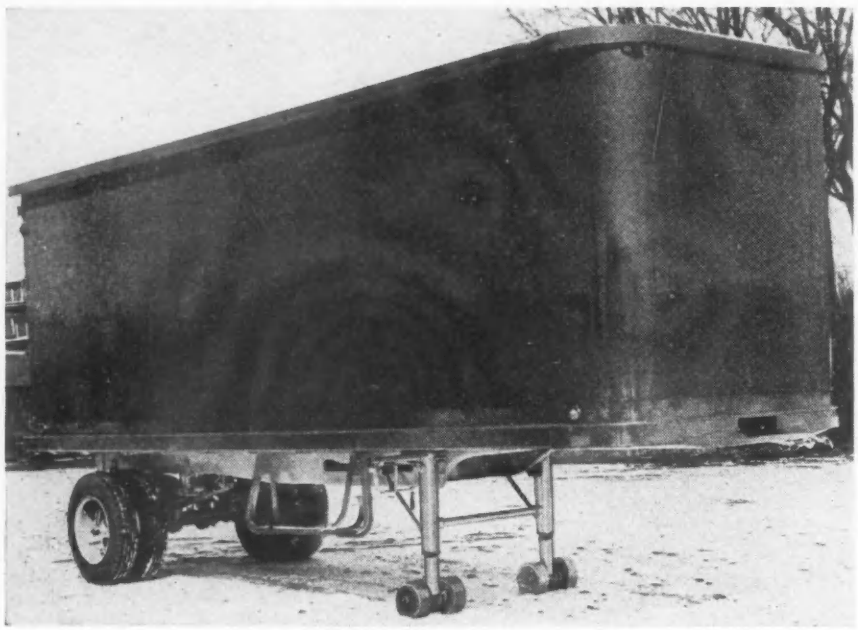
Exhibited at the American Road Builders' Association Show in Chicago recently, this mock-up model of the giant International TD-24 crawler tractor is shown being inspected by Fowler McCormick, chairman of International Harvester. Weighing 18 tons, the monster crawler is reportedly the world's most powerful.

QUICKER PICKER

International Harvester Co.'s one-man, one-row cotton picker designated the M-12-H, shown here, is now being produced at IHC's recently-opened plant in Memphis, Tenn. The picker is mounted on a modified Farmall M tractor. In fields averaging one bale an acre of open cotton, the picker, when operating at two mph, will gather about 95 per cent of the cotton in about one hour and 30 min, including 15 min for turning at the ends of the rows and dumping the basket.



NEWS *of the* AUTOMOTIVE INDUSTRIES



HEAVY DUTY BANTAM

The American Bantam Car Co., Butler, Pa. recently announced the development and production of this new model Supercargo Depot Transfer and City Delivery semi-trailer designed for heavy duty. It differs from other Supercargo models in that it has a 10 in. deep, full length frame under the cross members used regularly.

K-F to Pay All Dealer Warranty Expense

The Kaiser-Frazer Corp. has established a 100 per cent labor reimbursement program for K-F dealers for all warranty work involving replacement of parts. Under the new K-F program some 4200 K-F distributors and dealers will be paid at their full retail labor rate for parts replacements in any Kaiser or Frazer car during the standard warranty period covering the first 4000 mi or 90 days, whichever occurs first. The dealer is also reimbursed for any parts replaced. Industry practice has been to allow the dealer only a percentage of his retail labor rate for warranty work.

Main Line Trailer Takes Over Indiana Plant

The Main Line Trailer Coach Co., Evansville, Ind., will take over a new plant, with 57,000 sq ft of usable floor space, in that city on Jan. 1. Main Line expects to reach peak production at the plant by next April, at which time the company expects to produce an average of 395 home trailers monthly, the same production currently achieved in the Los Angeles plant, headquarters for Main Line.

Hudson Drive-Master Orders Up 50% Over 1947

According to George H. Pratt, vice-president in charge of sales of the Hudson Motor Car Co., orders for Hudson's automatic transmission, Drive-Master, are up 50 per cent over last year. Production of Drive-Master equipped cars is being hiked so that one out of every two Hudsons coming off the assembly line will be Drive-Master equipped.

Issue Replacement Standard for Government Cars

The Bureau of the Budget has issued a replacement standard for federally-operated passenger cars permitting replacement after six years or 60,000 miles of operation. Applying to more than 20,000 passenger vehicles in use by civilian agencies, the new standards will be inaugurated during the fiscal year beginning July 1, 1949.

General Tire Now Controls Marquardt Aircraft

Extending its activity in the jet engine field, the General Tire & Rubber Co. has acquired a controlling interest in the Marquardt Aircraft Co., Venice, Calif. Marquardt Aircraft is engaged in the research, development, and production of jet propulsion engines, particularly ramjet engines. Asked by the government, early in World War II, to take over the management of the Aerojet Engineering Corp., producers of jet-assisted-takeoff (JATO) units for aircraft, General Tire in 1945 also acquired a controlling interest in this company.

Shipments of Complete Aircraft and Aircraft Engines and Other Products of Their Plants, 1948*

AIRCRAFT

	May	Five Months
Complete Aircraft	953	3,958
Military Aircraft		
Number of Planes	141	879
Civil Aircraft	812	3,079
Personal Planes		
Number	778	2,988
Value	$3,164,874	$12,828,817
Transport Planes		
Number	34	91
Value	$15,819,336	$32,912,813
Aircraft Parts—Value	$1,980,243	$9,647,285
All Other Products—Value	$2,345,754	$14,015,513
Total—Value of All Products	$23,310,207	$69,404,428

AIRCRAFT ENGINES

	May	Five Months
Military Engines		
Number of Engines	491	1,928
Value of Engines	$20,218,103	$91,803,066
Value of Parts	$5,282,160	$23,582,463
Civil Engines		
Number of Engines	1,293	5,147
Value of Engines	$2,922,932	$15,727,134
Value of Parts	$1,878,590	$9,585,854
Total—Engines	1,784	7,075
Total—Value of Engines	$23,141,035	$107,530,200
Total—Value of Parts	$7,160,750	$33,168,317
All Other Products—Value	$268,972	$786,344
Total—Value of All Products	$30,570,757	$141,484,861

*—Bureau of the Census and Civil Aeronautics Administration.

NEWS *of the* AUTOMOTIVE INDUSTRIES

New Douglas Div. to Make Pressed Metal Products

Harry Woodhead, former head of the Consolidated - Vultee Aircraft Corp. has joined the Douglas Aircraft Co. as general manager of its new Metal Products Div. This is a new and separate Douglas division which will make a wide variety of pressed metal products. A. W. Larsen, formerly purchasing director of Consolidated-Vultee, and prior to that executive in charge of purchasing and materiel for the Maritime Commission and GM will be Mr. Woodhead's assistant. Experimenting with several non-aviation products, Douglas has made quantities of pressed metal products such as automobile fenders, radiator shells, and other automotive parts.

Willys Procurement Div. Revamped

Willys-Overland Motors has completely reorganized its procurement division. Walter D. Appel, Willys procurement chief, pointed out that in order to reallocate purchasing responsibility into more logical groupings according to the type of materials bought, the reorganized division had been divided into two major groups: one for purchases of productive material, and the second for materials classified as non-productive.

New Fisher Plant in Ohio Now in Production

Now at the rate of about five bodies an hour, production of station wagon bodies for GM's Chevrolet and Oldsmobile Divisions has started at the new Fisher Body plant in Euclid, O. Output will be boosted steadily, it is expected, until an estimated rate of 4500 bodies a month is reached sometime in 1949. The plant has taken over the station wagon production from the Fisher body Plant No. 1 in Cleveland. It will also produce completely finished panel delivery truck bodies.

Packard Transmission Tooling to Cost to $7 Million

More news about the new automatic transmission that the Packard Motor Car Co. has under wraps was given by George T. Christopher, president, who stated that the company would spend $5 million to $7 million, in addition to other necessary costs, on new tools required to produce the new automatic transmission. Mr. Christopher still withheld the production timetable for the device, but he did reveal that it was entirely new, and that it would be built at the Packard plant in Detroit.

Firestone's New Zealand Tire Plant Producing

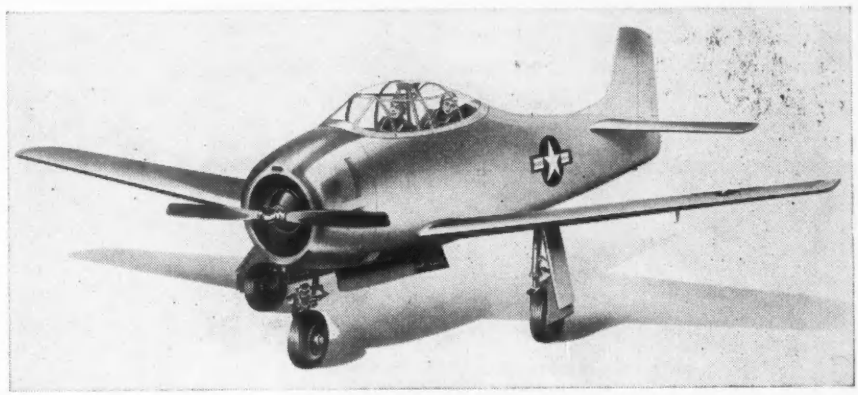
The Firestone Tire and Rubber Co. is producing the first tires ever to be made in New Zealand in its newly-completed factory near Christchurch, Harvey S. Firestone, Jr., chairman, disclosed recently.

Plastic Boat Powered by Crosley Engine

A new all-plastic craft with a 16-ft hull, is now being mass-produced by Gar Wood, Jr. Powered by the 26.5-hp Crosley engine, the new boat weighs 700 lb, seats four comfortably, and cruises at over 30 mph.

Riley Introduces New Sports Car

A sports version of the 2½-litre Riley automobile has been introduced by the Nuffield Co., Coventry, England. It is a three-seat open sports car, and has "torsonic" independent front suspension and semi - elliptic springs in the rear.



HIGH SPEED TRAINER

To prepare pilots for high-speed jet aircraft, 268 USAF North American Aviation T-28 trainers, will be produced by NAA under a recently awarded contract. Shown in the artist's sketch above, the T-28 is said to be the first U.S. primary-basic trainer to be designed to use a tricycle landing gear. The plane is powered by a Wright R-1300 engine, and has a top speed of 292 mph. Its normal gross weight is 5862 lb.

Link Ground Trainer for Jet Flying

The development of a device to speed the training of pilots for jet plane supersonic flying has been announced by Link Aviation Inc., Binghamton, N. Y. Edwin A. Link, president, said that the new ground training device would be the most advanced trainer ever built, and that it would make use of electronic, pneumatic, electrical and mechanical systems to synthesize all conditions of jet flight.

Willys Nine Month's Net Up 124% Over Last Year

More than doubling its earnings for the first nine months of the previous fiscal year, Willys - Overland Motors' net earnings for the nine-months period ending June 30th were $5,216,963, an increase of 124 per cent over the net earnings of $2,329,-990 for the corresponding period in the 1946-47 fiscal year. Willys reported that net sales for the first nine months of the current fiscal year were $138,349,855 as compared to $101,762,065 for the previous period.

Wage & Hour Administration Has New Overtime Formula

The Wage and Hour Administration has announced a new formula to cover the regular rate of pay on which overtime is based. The formula which has been adopted to clarify the recent Supreme Court decision on "overtime-on-overtime" in two cases involving longshoremen will go into effect Sept. 15. The formula is as follows:

"Extra pay given an employe for work on Saturdays, Sundays, holidays or at night must be averaged into the regular rate unless this pay is conditioned on the number of hours or days previously worked. In addition, such extra payments cannot be used by the employer to meet the law's requirement for time and a half for work in excess of 40 hours a week. This means that extra pay given a worker whose work-week customarily includes week-end or night work cannot

(*Turn to page 64, please*)

How Effective

ENACTMENT of the Taft-Hartley labor act touched off acrimonious debate which is continuing as a major issue in the current political campaign. Labor leaders have been quick to scream that it enslaved the unions; some Administration officials have bitterly attacked it as fomenting labor unrest.

It would seem that perhaps Administration spokesmen should take another look at their own figures. Data supplied by the Bureau of Labor Statistics show that labor and management are making out reasonably well under the new law.

The BLS is a division of the U. S. Labor Department which certainly could never be accused of being anti-labor. Its figures show a continued downward trend of labor-management disputes and work-idleness since the Act became effective.

According to the BLS records, 1946 was the nation's worst year as measured by idleness caused by strikes. This was the last full year before the Taft-Hartley law. There were twice as many strikes, three times as many workers involved, and nearly four times as many man-hours lost during the average month of 1946 than the average month under the new law. To be more precise, some 383,000 workers were walking off the job in 415 different strikes and 9.7 million man-days were being lost each month that year. Since last September, the monthly average has been 201 strikes, 135,000 strikers, and about 2.8 million man-days lost to industry.

Looking to the situation from another angle, the figures show that in the first year after World War I, one out each five workers (20.8 per cent) went on strike at one time or another. In the first year after World War II, the figure was one worker out of seven (14.5 per cent). Comparable figures for the second postwar year of each conflict show 7.5 per cent of all workers striking in 1920 against 6.5 per cent in 1947.

These statistics are recognized by Acting Secretary John W. Gibson of the Labor Department and boss of the BLS. However, it is his contention that the situation would have been better had not the Wagner Act been revised.

"Fact-finding procedures set up by the Taft-Hartley law actually delay or prevent settlements because the panels cannot make a recommendation but only report on the facts," he declares. "This is far different from the fact-finding boards established by U. S. Conciliation Service when it was under the Labor Department. These boards made recommendations for a mutually satisfactory settlement. Under present procedures, after something like 80 days the parties are right back where they started, faced with a statement of facts with which they were intimately acquainted all the time."

Much of the antagonism of Gibson to stem a fear that the Act opens the way for management to destroy labor's gains by means such as union-busting and restoration of yellow dog contracts, and that employers will make indiscrimate use of the once prohibited injuction.

The record thus far, however, is a different story.

"The number of labor-management disputes has increased."

Democratic 1948 Platform.

"Since the Labor-Management Relations Act became effective, strikes in manufacturing industries, bituminous coal mining, and private building industry, have decreased substantially. . . . (It) will not prevent all strikes but will bring a greater measure of (industrial) peace."

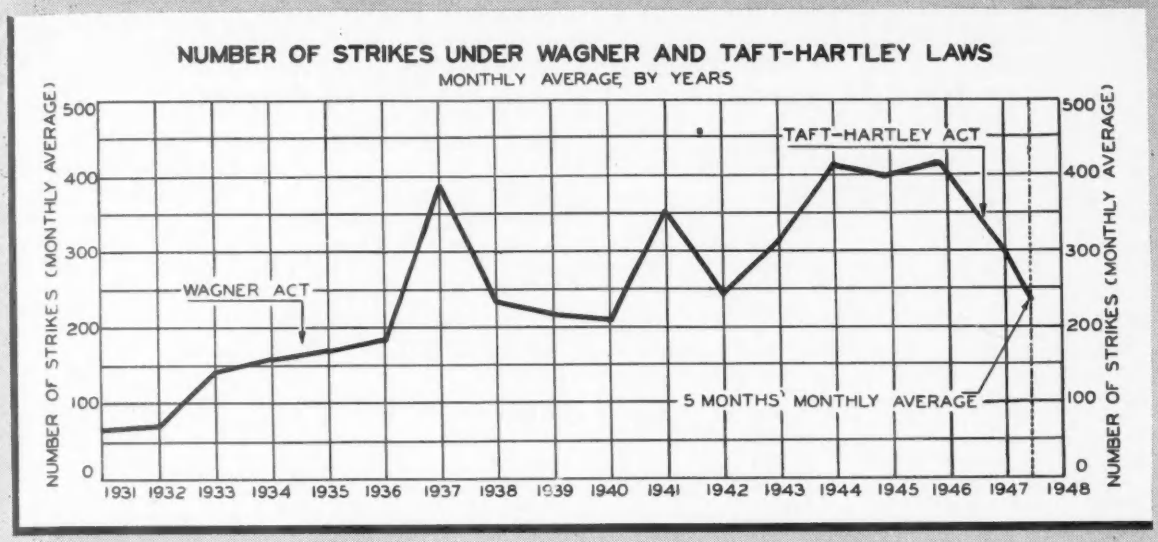
Representative Charles A. Halleck, of Indiana. House Majority Leader.

"These (automobile-worker contracts) give promise of uninterrupted production until the backlog of demand for automobiles is satisfied."

Monthly Labor Review (June) Bureau of Labor Statistics.

"It is the propaganda line of the framers of the Taft-Hartley Law . . . that the law was necessary to prevent a wave of impending strikes. . . . I am convinced that the law was actually responsible for many of the strikes that occurred last year and that the figure would have been lower if the law had not been enacted."

John W. Gibson, Acting Secretary of Labor.



Is the Taft-Hartley Law?

The Answer Is Given in the Latest Data on Strikes and Worker Idleness Compiled by the Bureau of Labor Statistics and Here Presented

By Karl Rannells, Washington Bureau, Automotive Industries

In fact the BLS does not adhere to this pessimistic viewpoint of its boss. Instead, it sees recent settlement of disputes by some of the bigger corporations as a "constructive approach to several of the basic issues involved in current wage negotiations."

The way in which the automobile industry strikes have been settled, the Bureau further believes, "improves the prospect for the immediate future."

Looking back over the first half 1948, the Bureau cites the new wage agreements with automobile workers as improving "the prospect for the immediate future." The General Motors agreement, it points out, "puts into effect the principle advocated by the unions since the end of the war that workers should share in increased productivity." While the settlement of the Chrysler dispute did not make provision for a cost-of-living formula as in the GM case, the BLS sees it as following the same trend.

"These contracts," it goes on to say, "and the possibility of others in the automobile industry gives promise of uninterrupted production until the backlog of demand for automobiles is satisfied." (Note: Ford, last of the Big Three, settled along the same lines shortly after the foregoing statement. Ed.)

In the meantime, BLS has completed its final tabulations on strikes in 1947. Its report shows that a total of 3693 occurred during the year. They involved a total of 2.1 million workers and resulted in 34.6 million man-days of production lost.

Only 15 of the strikes involved as many as 10,000 or more workers. A good many involved as few as six (the BLS does not count less than that number in its figures).

Largest strike of 1947 was the telephone stoppage, involving 370,000 employes. Next came the bituminous coal strike which idled 343,000 workers.

During the year, only two strikes occurred in the automobile manufacturing industry which idled 10,000 or more workers. Both involved the Hudson Motor

Work Stoppages from Labor-Management Disputes

Month and year	NUMBER of STOPPAGES Beginning in month or year	WORKERS INVOLVED in STOPPAGES Beginning in month or year	MAN-DAYS IDLE DURING MONTH OR YEAR Number	Percent of estimated working time
1935-39 (average)	2,862	1,130,000	16,900,000	0.27
1945	4,750	3,470,000	38,000,000	.47
1946	4,985	4,600,000	116,000,000	1.43
1947	3,693	2,170,000	34,600,000	.41
1947: January	320	105,000	1,400,000	.1
February	296	75,000	1,230,000	.2
March	361	95,700	1,100,000	.16
April	479	624,000	8,540,000	1.2
May	471	230,000	6,730,000	1.0
1948: January	175	75,000	1,000,000	.1
February	200	70,000	725,000	.1
March	225	500,000	6,000,000	.8
April	275	175,000	8,000,000	1.1
May	275	165,000	4,100,000	.1

These figures include all known work stoppages, arising out of labor-management disputes, involving six or more workers and continuing as long as a full day or shift are included in reports of the Bureau of Labor Statistics. Figures on "workers involved" and "man-days idle" cover all workers made idle in establishments directly involved in a stoppage. They do not measure the indirect or secondary effects on other establishments or industries whose employees are made idle as a result of material or service shortages.

Car Co. (15,000 workers) and each lasted two days.

While strike idleness last year was greater than in most preceding years, it was considerably less than either 1945 or 1946. A better gage for measurment is weighing the percentage of striking workers against the total employment. This was the smallest in history, especially during postwar years.

Viewed from any standpoint, the trend during the final months of 1947 and early 1948, was undeniably downward. Whatever the reason, chances seem rather slim for any except minor revision of the Taft-Hartley law until it has had a good try-out.

Nominations Requested for Alloy Steel Awards

IN connection with the "Salute to Alloy Steel" celebration of the 75th anniversary of the first engineering use of an alloy steel to be held at the National Metal Congress and Exposition Oct. 25-29 in Philadelphia, the American Society for Metals will present "Distinguished Service Awards" to individuals who have made outstanding contributions to the development, application and progress of these important steels in all branches of industry.

A committee will consider the names of living individuals who can justifiably be honored for their contributions to progress in the realm of engineering alloy steels in contradistinction to tool steels and the high alloy steels. The recognition will take the form of distinguished service awards, and this committee will consider nominations submitted to them and select outstanding individuals in all branches of the field.

Readers of AUTOMOTIVE INDUSTRIES are urged to submit to the committee names of people now living who really did an outstanding job in helping to bring alloy steels to their present state of development. Add supporting remarks or evidence deemed appropriate and mail the letter to J. M. Schlendorf, Chairman, Distinguished Service Awards Committee, c/o Republic Steel Corp., (*Turn to page* 90, *please*)

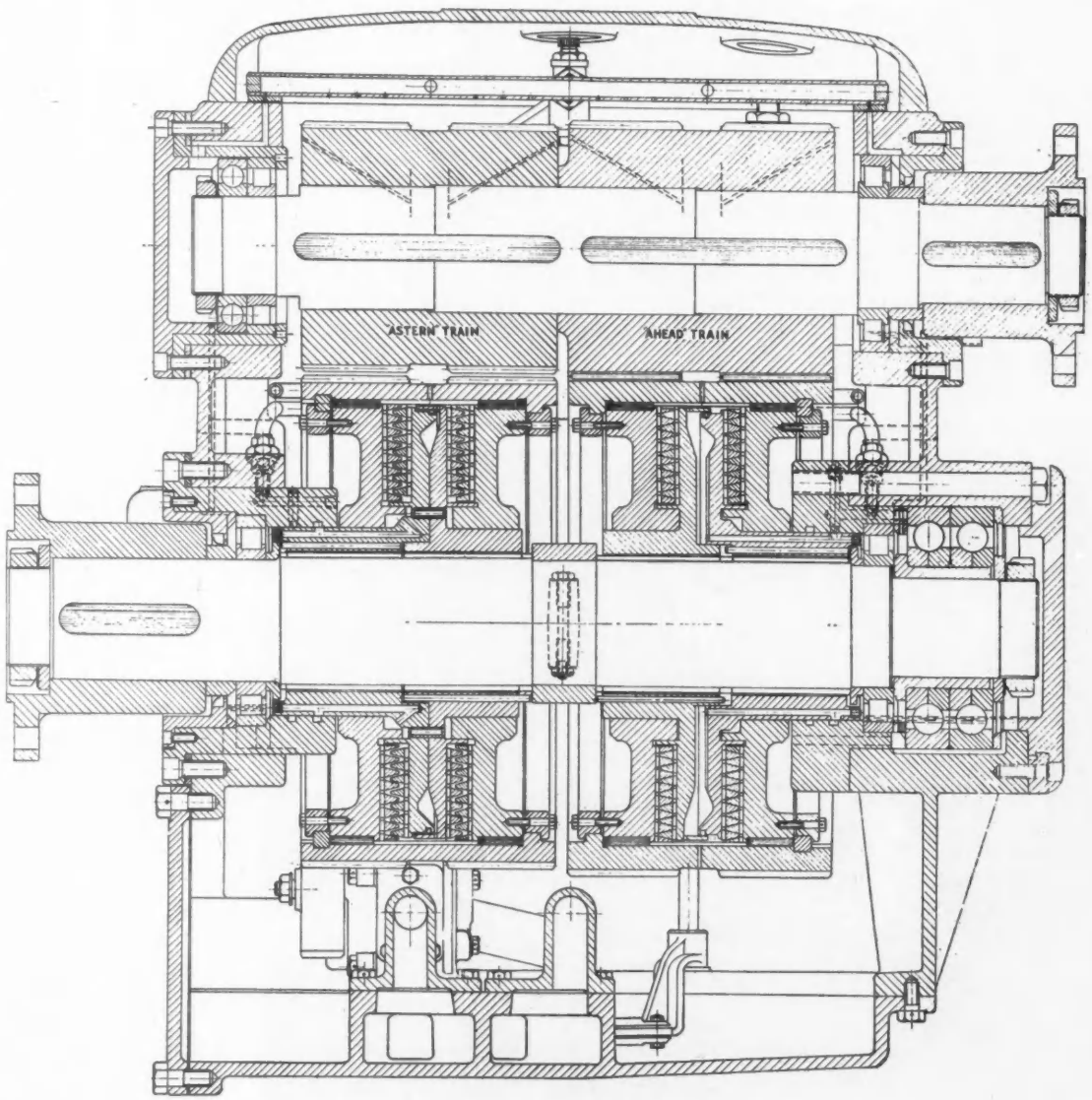
British Oil-Controlled Marine Reverse Gear of Special Design

AN oil-controlled marine reverse-reduction gear of unusual construction has been designed for tugs, trawlers, and pleasure craft by David Brown & Sons (Huddersfield) Ltd., England. It has a flat, smooth exterior and the only external pipe is that carrying pressure oil from the pumps to the heat exchanger and back to the gearcase. Duplicate oil pumps of equal capacity are installed; one as a standby. Movement of a lever on the outside of the case effects change over from one pump to the other.

This unit transmits 510 bhp at 600 rpm input to 302 rpm output (rating: forward, 52,000 hours life; reverse 6500 hours). Hobbed double helical gears are employed, with a working face width of 10¼ in. for the forward gears and 9¾ in. reverse, the latter of which include an idler gear. The pinions are pressed and keyed on to the input shaft, which is supported on ball and roller bearings.

The outer members of the multi-groove clutches are steel and are the side plates of the wheels. The bronze inner members are splined in their bore and engage with the output shaft, at the forward end of which are specially paired duplex bearings to take propeller thrust.

Located at the bottom of the cast iron gearbox are two David Brown 6H Roloid pumps, gear driven from the reverse wheel. Both run continually; one discharges oil under pres- (*Turn to page* 90, *please*)



Using an Old Technique to Too Difficult to Produce

By Joseph Geschelin

IT was not fortuitous circumstance that the Allison-Bedford Foundry was prepared to undertake production of aluminum torque converter castings for the Buick Dynaflow transmission. The Allison-Bedford Foundry of the Allison Division, General Motors Corp., is an uncommon foundry operation. Even casual observation shows that engineering and research motivate the activity in every direction.

Although it has attracted attention because of specialization in the Antioch plaster mold technique, this foundry is departmentalized to make high grade aluminum castings by other methods such as dry sand molding and permanent mold casting, and thus can meet the requirements of any specific problem. Consequently, it is flexible in its approach to any job—both in facilities and in thinking.

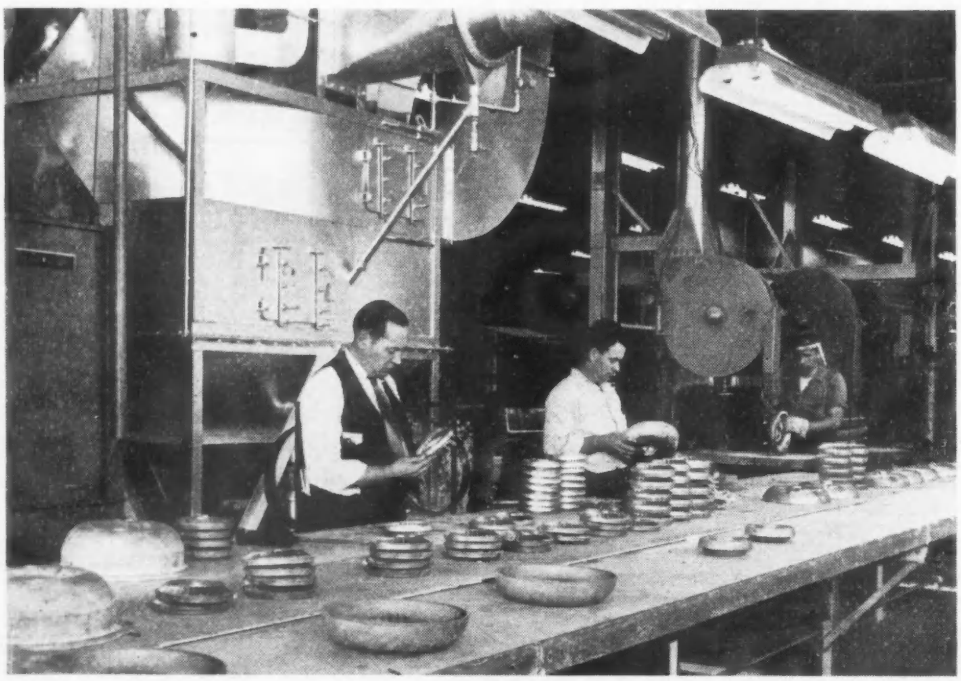
To realize its objective, the entire operation is based upon the scientific approach that comes from competent engineering at the core. Engineering comprises facilities for design and development, and a comprehensive control laboratory with departments for chemical and metallurgical research as well as physical testing. In addition, it boasts a full scale pilot foundry for trying out all new developments before they are released for production. In keeping with this outlook they stress good housekeeping and comfortable working conditions—still uncommon in the foundry business—to encourage good, intelligent workers.

Located in Bedford, Ind., the foundry was built before our entry into the war. During the war it was operated by the Delco Remy Division of General Motors for the production of aluminum cylinder head castings for Allison engines, and later for the making of cylinder heads for Packard Rolls-Royce engines as well.

Even before General Motors had acquired this plant, C. F. Kettering had effected arrangements to underwrite the development of the Antioch process. Following the end of the war, the foundry was acquired by Allison and expanded in physical size—practically doubled in floor space—and placed on an exceptionally high plane from the standpoint of engineering personnel by building an organization selected from the Antioch laboratories, the Delco-Remy aluminum foundry in Anderson, and key men from the Allison foundry control group.

While the basic principle underlying the Antioch technique goes back several centuries, up to the time it was exploited by GM it had not been adapted for making mechanical parts possessing unique physical properties. Today the plaster mold technique is intended for parts difficult to make by any other means but is by no means either either simple or inexpensive. Hence it is being given the benefit of continuing study to simplify and improve and make more economical.

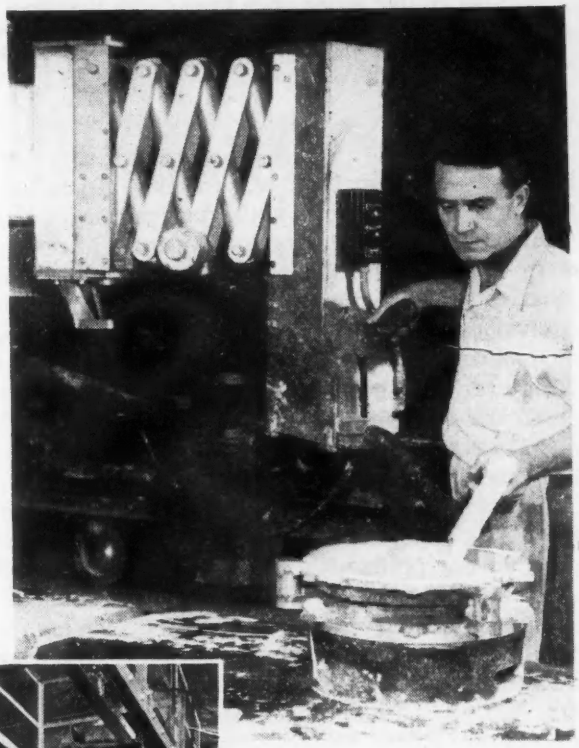
When Buick engineers

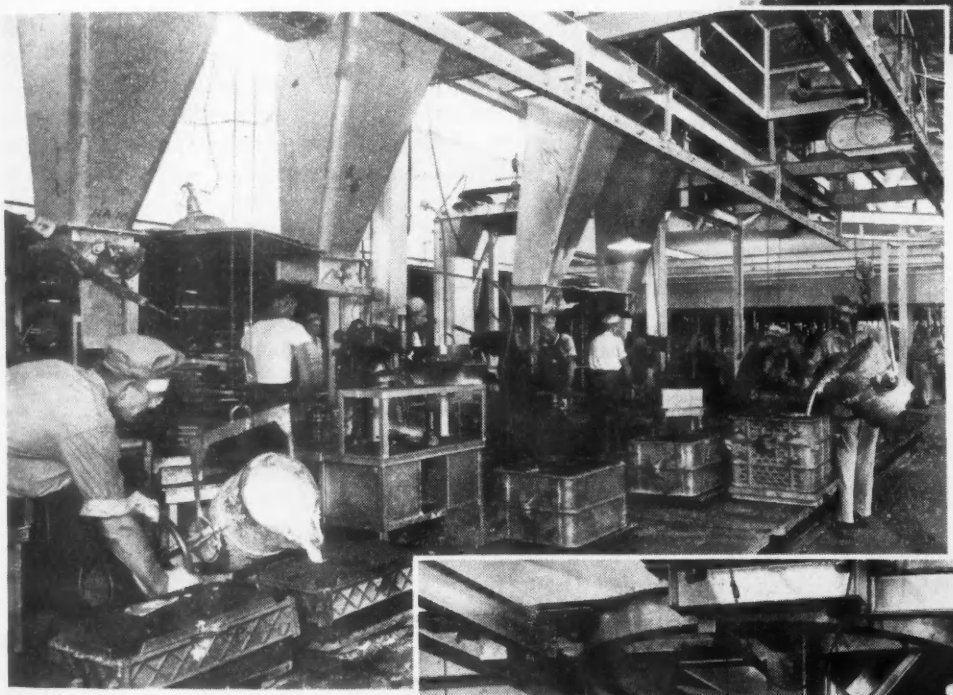


This is the inspection bench for acceptance of the variety of Dynaflow converter castings made at Bedford. The Vapro-Blast unit, mentioned in the text, may be seen in the background at the left.

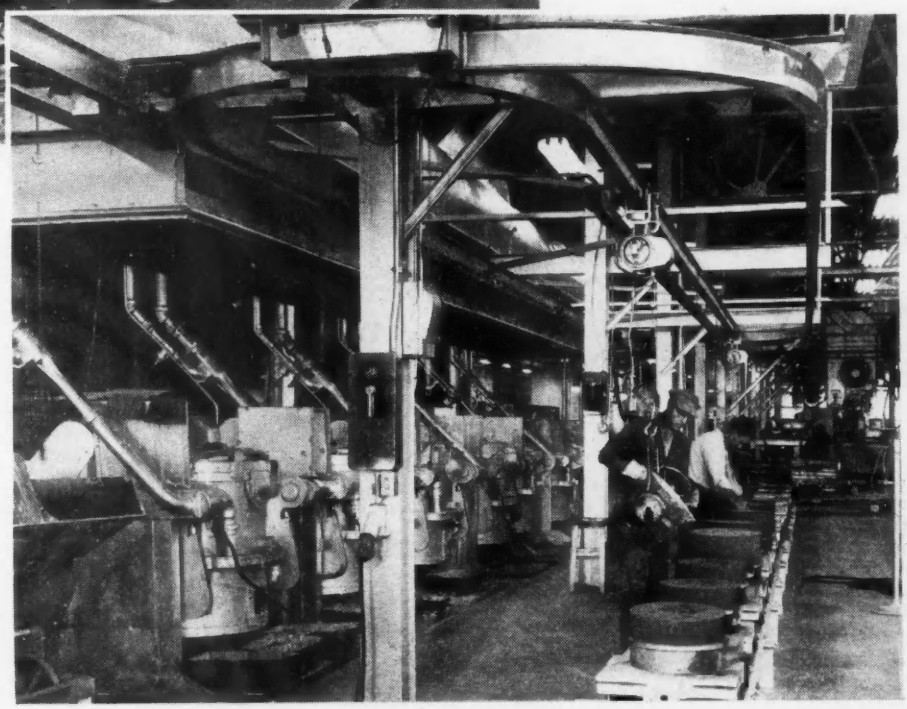
Make Parts by Other Means

Allison-Bedford Foundry of General Motors specializes in Casting Aluminum Parts by Antioch Plaster Mold Process for Buick Torque Converters, Detroit Diesel Engines and Other Equipment





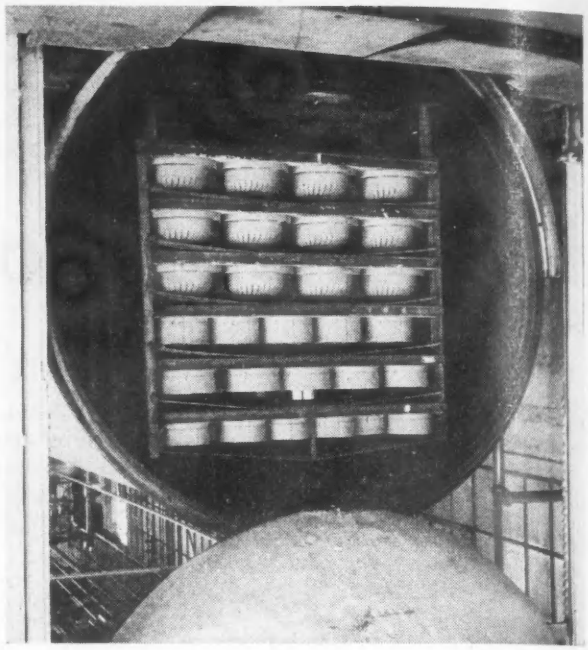
(Above) The wet mixer, to the left out of this view, is moved between two mechanized pallet conveyors carrying the hundreds of molds in which the plaster mold sections are made. Here the operator is filling a mold by running the wet mix through the flexible hose.



(Above) View taken in the dry sand molding department shows the pouring of large molds while they are moving on the heavy duty conveyor. Incidentally, this conveyor is part of the equipment transferred from the Delco-Remy aluminum foundry.

(Right) Pouring of Dynaflow molds is done on this mechanized conveyor, the molds shown here having plaster drags and dry sand copes. The holding furnaces may be seen in the background.

The plaster curing cycle begins with treatment of plaster molds in this enormous autoclave where work is held in an atmosphere of steam under 17 psi.



began to study method of producing Dynaflow elements they were faced with the realization that all commercial torque converters currently in production were made of steel conponent parts, requiring an amazing complication of machining and assembly operations. Apart from fabrication costs the program of tooling a new converter involved a considerable outlay for tooling and dies. In addition to this investment the conventional pattern would tend to freeze intial design as the expense of early changes or improvements would be almost probitive.

It is in this sphere that the Antioch process has proved its importance. Here is a method which makes possible the production of intricately cored castings of aluminum alloy with usually close dimensional tolerances in the "as-cast" condition, comparable to high grade die castings, and exceptional surface smoothness associated with the plaster mold process. The castings have other essential characteristics, including—complete freedom from porosity, enhanced fatigue value, and high physical properties. From the standpoint of physical properties, they are said to compare favorably with ferrous castings.

Moreover, although the cost per pound of Antioch castings is higher than for aluminum sand castings, the initial tool investment is low as compared with a fabricated steel design, hence provides the flexibility of change so vital in the development of any new mechanism.

Secondary metal is used exclusively. This is quite a departure in aluminum foundry practice considering the emphasis upon virgin metal. Secondary aluminum alloy ingots are supplied by an outside source and shipped to Bedford where all metal is duplexed to assure conformity to Allison specifications.

(*Turn to page 70, please*)

(Above) This is a section of the rubber-like plastic mold developed for making plaster cores for blower rotors. The operator is demonstrating the flexibility of the mold and its insert sections.

(Below) The assembly of dry sand cores for large piston castings gives some impression of the physical size of piston castings required for locomotive Diesel engines.

Will the Aircraft Industry Be Labor's Next Battleground?

By Robert McLarren

THE aircraft manufacturing industry, struggling to accelerate tooling, hiring and production to meet the expanded fiscal 1949 procurement program, is plagued by growing labor troubles that hint of only increased difficulties ahead. Having survived the critical years since V-J Day substantially intact, the industry had looked to the new 70-Group program as an avenue for recouping its heavy financial losses of the past three years and emerging in 1952 as a profit industry. The clear promise of higher wage demands, relaxed worker productivity and costly work stoppages has tempered the industry's optimism and many executives see slim hope of profits in the next three years.

The "third round" has hit the industry full force, after a strategic delay by the unions while the automobile industry situation crystallized. It is this combination of victory in the automobile and agricultural implement industries with the broadly expanded aircraft procurement program ahead that has given the unions a sound tactical advantage. Aircraft industry offers of five cents an hour since the first of the year have had hard going against the national pattern of the third round averaging 10-15c an hour in the coal, steel, aluminum, electrical, rubber and automobile industries.

Demands on the aircraft and allied industries in the past few months have followed a 15-30c pattern with settlement in the 10-15c bracket in some cases. However, settlements to date have been temporary and in no case has a company-union agreement on a long-term contract been obtained. One strike, white-collar workers at Lockheed Aircraft Corp., was settled for five cents an hour and another, also white-collar workers at Wright Aeronautical Corp. was settled for 10c an hour but both were special situations outside the broad front of the union attack. Temporary settlement of the Bendix South Bend and Detroit plant disputes with five locals was gained at 13½c an hour. The Boeing strike, most serious to date, remains unsettled but the company is offering 15c an hour increase to new employes, many of which were strikers.

It was the victory of Walter Reuther in his fight to oust the Thomas-Addes-Leonard faction in his United Automobile, Aircraft and Agricultural Implement Workers Union—CIO at Atlantic City last Fall that touched off the industry attack. With his union freed of non-Reuther elements, Reuther launched the third phase of the aircraft industry labor program. The militantly open-shop industry began to get chinks in its armor during World War II when unionization of the main bodies of its workers got under way. Bloody strikes, such as those at Douglas and North American shortly before Pearl Harbor, had paved the way for these wartime consolidations. After V-J Day, when industry profits sunk to their lowest ebb, unions launched the second phase of their program by signing up the smaller miscellaneous groups in the industry, the office workers, supervisors and classes of workers unique to that industry. The current third phase is a program to integrate the various memberships into an industry-wide bargaining agent and consequent labor monopoly.

Union activity in the industry quieted after V-J Day in tune with the mass separations, low production and financial losses of most companies. But as industry hit bottom and completed the major portion of its shake-down period, the unions quietly resumed organizing activities. The past year has witnessed a bitter struggle between the two major aircraft unions in shop elections. Vieing for the 185,000 aircraft workers are the UAW-CIO and the international Association of Machinists and there have been few elections in which challenged votes, demands for recounts and counter-charges between these two groups have not flown. These elections have been close. Consolidated-Vultee workers choose the IAM by a 3437 to 3414 majority in March. Glenn L. Martin workers voted for the UAW-CIO by a comparably slim margin in May.

Crafts locals of the AFL are also strong contenders in the UAW-IAM struggle with special groups signing separate contracts with management. For example, International Brotherhood of Electrical Workers recently signed 45 maintenance electricians at Consolidated-Vultee to a company agreement in spite of a UAW-CIO-company plant-wide agreement. Independent unions, such as the United Aircraft Welders of America, Engineers and Architects Association of Southern California, and others hold small segments of plant workers which have become special problems for management.

Neither the IAM nor UAW have been able to consolidate their gains with their strongholds being

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An Analysis of Vee-Type and

By P. M. Heldt

A CERTAIN amount of interest in six-cylinder Vee engines for passenger cars has developed recently especially in and around Detroit. This interest seems to stem from the movement toward higher compression ratios, which calls for more rigid engine structures and already has led to the design of a number of new Vee-Eight engines.

In the past, Vee-type engines have been built with two, four, eight, twelve and sixteen cylinders. Four-cylinder Vees, of course, are quite rare, but I know of one case where such an engine was put in production as a replacement for single-cylinder units in early automobiles. I am not in position to say that no Vee Sixes have ever been built, but if they have it has not come to my attention. If the Six was passed by in the march of progress from Vee Twins to Vee Sixteens, there undoubtedly was a reason for it, and the most probable reason is that the Vee Six cannot be endowed with all of the qualities desirable in an automobile engine.

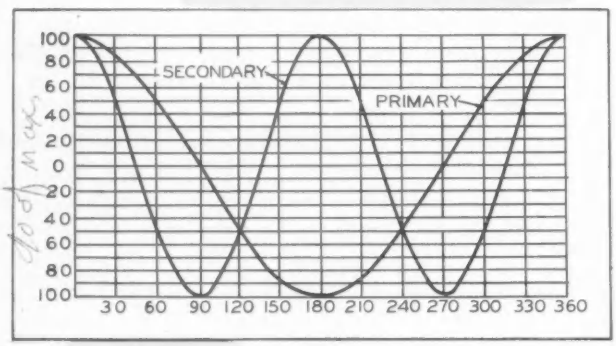

Fig. 1—Curves of primary and secondary inertia forces on the reciprocating parts of an engine during one crankshaft revolution.

As pointed out in a previous article in balance conditions in five-cylinder in-line engines (see AUTOMOTIVE INDUSTRIES Jan. 15, 1947, page 34), the objects usually aimed at when deciding on the number and arrangement of engine cylinders are uniform spacing of explosions and freedom from shaking forces and rocking couples. To these, it seems we must now add a high degree of structural rigidity of the engine. Six is the minimum number of cylinders with which it is possible to obtain both uniform spacing of explosions and freedom from shaking forces and rocking couples without the use of special balancing devices. These qualities are inherent in the six-cylinder in-line engine, and it is therfore only natural that as long as no special conditions have to be met, sixes always are built as in-line engines. However, the need for greater structural rigidity has focused attention on the possibilities of other arrangements.

A six-cylinder Vee would consist essentially of two three-cylinder in-line blocks on a common crankcase. It is not difficult to obtain uniform spacing of explosions with such an engine, but freedom from rocking couples seems to be impossible with this construction. In a six-cylinder, four-stroke engine, since there are six explosions in two crankshaft revolutions or 720 deg of crankshaft motion, cylinders must fire at 120-deg intervals. The conventional three-cylinder in-line engine has a three-throw crankshaft with throws spaced 120 deg. If we take such an engine and add another bank of three cylinders at an angular distance of 120 deg from the first, and connect the pistons of the second bank to the same crankpins to which those of the first bank are connected, we have a Vee Six. Of course, to make this possible it would be necessary to increase the distance between cylinder center lines, to offset

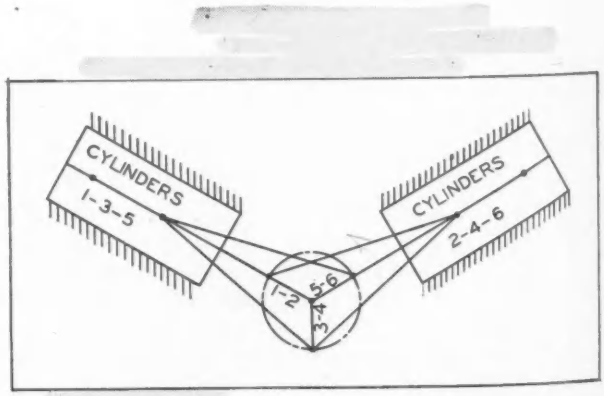

Fig. 2—Diagram of 120-deg. Vee Six engine with three-throw crankshaft

Flat Six-Cylinder Engines

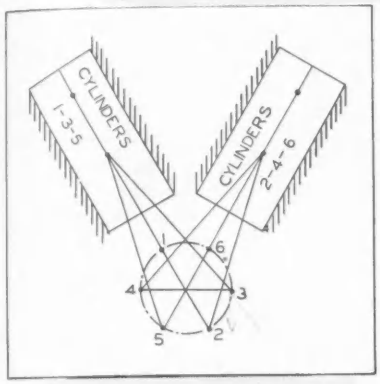

Fig. 3 — Diagram of Vee Six engine with six - throw crankshaft and 60-deg angle of Vee.

one bank relative to the other in the direction of the crankshaft axis, and to lengthen the crankshaft to enable each crankpin to accommodate two connecting-rod big ends side by side.

It is well known that in a three-cylinder in-line engine with a three-throw 120-deg crankshaft there are no shaking forces, but it is also known that such a construction gives rise to both primary and secondary rocking couples. This can readily be demonstrated with the aid of Fig. 1, which shows the variations of the primary and secondary inertia forces on the reciprocating parts in an engine cylinder throughout one crankshaft revolution. In the chart both forces are plotted in percentages of their respective maximum values, and it may be pointed out here that in an engine the secondary force is only about one-fourth as large as the primary. The ends of the horizontal scale (0 deg and 360 deg) correspond to the top dead center position in a vertical engine, at which both the primary and the secondary force are directed upward and are at their maximum values. That there are no shaking forces in the three-cylinder engine is proved by the fact that if three verticals, 120 deg apart, are erected anywhere on the base line, to correspond to the angular spacings of the crank throws, and the inertia forces corresponding to these crank positions (either primary or secondary) are read off and added, the sum is always equal to zero. For instance, with the forward crank in top dead center, the primary inertia force on its reciprocating parts is upward and equal to 100. The intermediate crank then will be at 120 deg, and the primary inertia force on it will be downward and equal to 50. The rear crank will be at 240 deg and the primary force on it also will be downward and equal to 50. Thus the primary inertia forces on the intermediate and rear cranks combined will exactly equal that on the forward crank, and oppose it, hence there will be no shaking force. However, since the force on the forward crank is upward while the forces on the other two cranks are downward, there is a couple on the crank in the plane of the cylinder axes. After 180 deg of crank motion the primary inertia forces on all three cranks again have the same value, but they have changed direction, and the couple therefore is a reversible one—a rocking couple. Secondary inertia forces change direction every 90 deg of crank motion. These two characteristics of the three-cylinder in-line engine, viz., freedom from shaking forces and presence of both primary and secondary rocking couples, are of great help in an analysis of the Vee Six.

Let us now consider a six-cylinder Vee engine with a three-throw 120-deg crankshaft. A diagram of the crank trains of such an engine is shown in Fig. 2. The cylinders of the left bank are numbered 1, 3, and 5, those of the right bank 2, 4, and 6. Assuming cylinder No. 1 to fire, cylinder No. 3 may fire after 120 deg of crank motion, cylinder No. 5 after 240 deg, cylinder No. 6 after 360 deg, and so on, the firing order being 1-3-5-6-2-4. As each bank of three cylinders is free from shaking forces, the engine as a whole also will be free from such forces. But there will be both a primary and

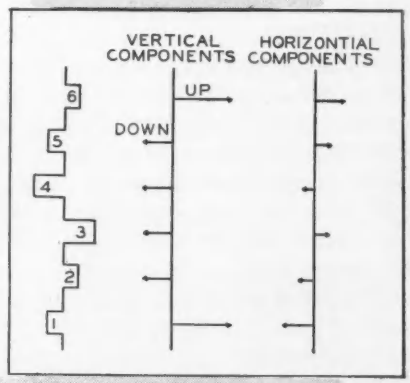

Fig. 4—Diagrammatic top view of six-throw crankshaft and plots of vertical and horizontal components of combined inertia forces

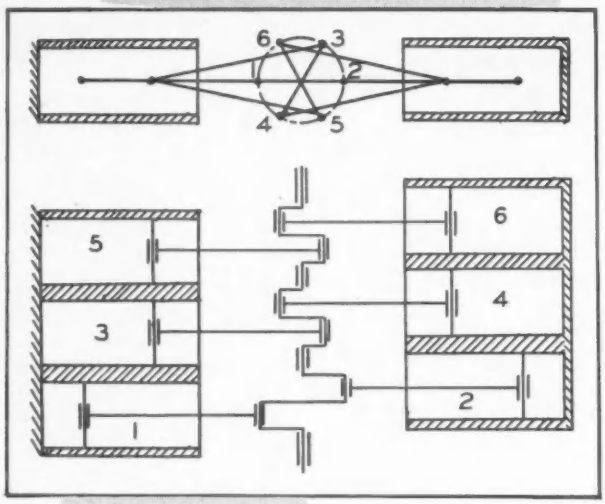

Fig. 5—Diagram of horizontal opposed six-cylinder engine.

a secondary rocking couple on each bank, and since the rocking couples on the two banks act in planes at 120 deg (or 60 deg), they cannot possibly neutralize each other. In addition to acting in different planes, these rocking couples are out of phase by 120 deg. That they act in planes making a large angle with each other tends to reduce the combined effect, because if the two were in phase and the angle were increased to 180 deg, they would act in the same plane but in opposite directions, and therefore would neutralize each other. On the other hand, the fact that they are greatly out of phase tends to increase the combined effect. While means are available by which counter rocking couples can be produced, these would be too complicated to deserve consideration, since four different rocking couples would have to be countered.

It is possible to obtain uniform spacing of explosions in a six-cylinder Vee also with an angle of 60 deg between cylinder banks, but that calls for the use of a six-throw crankshaft. The crank-train arrangement is shown diagrammatically in Fig. 3. Crank No. 1 is shown in the top center position and cylinder No. 1 therefore may fire. This will be followed after 120 deg crank motion by cylinder No. 5, after 240 deg by cylinder No. 3, after 360 deg by cylinder No. 6, after 480 deg by cylinder No. 4, and after 600 deg by cylinder No. 2. Here again there are no shaking forces in the planes of the cylinder axes, but there is both a primary and a secondary rocking couple due to each bank of cylinders, and since these couples act in planes making an angle of 60 deg with each other they cannot possibly balance each other or cancel out. It appears that the two rocking couples in planes making an angle of 30 deg with the vertical combine to make a horizontal rocking couple. This is illustrated in Fig. 4, where the view on the left is a diagram of the crankshaft as seen from the top. Cranks 1 and 6 both are in the top center position (Fig. 3) and the primary inertia forces on their reciprocating parts are both at their maximum values and directed upward at an angle. Their vertical components therefore are both upward in direction and equal in value, as indicated in the central view in Fig. 4. All of the other four cranks are at 120 deg from the topcenter position, hence the primary inertia forces on all of them are at one-half their maximum value and directed downwardly. These also are plotted in the central view, and it is apparent that the vertical components do not produce a couple. It is different with the horizontal components, which are plotted in the view on the right. Since the inertia force on crank No. 1 is upward toward the left, its horizontal component is toward the left, while the horizontal component of the inertia force on crank No. 6 is toward the right. As the primary forces on cranks Nos. 3 and 5 have negative values and therefore act downwardly along the cylinder axes of the left bank, their horizontal components are opposed in direction to that of crank No. 1, as shown. Also, the inertia forces on cranks Nos. 2 and 4 are opposed to that on crank No. 6. From the plot of these forces it is obvious that there is a horizontal couple on the crankshaft. After 180 deg of crank motion all primary forces and their components are reversed, hence the couple is a rocking one.

Many other arrangements of Vee Sixes besides those here considered are possible. For instance, an engine with 90 deg between cylinder banks and a three-throw 120-deg crankshaft can have its primary couples balanced out by counterweights on the crankshaft on the same principle as in a Vee Eight with two-plane crankshaft, but in such an engine the explosions would come at unequal intervals, 90 and 150 degs, which would be rather undesirable. With six-throw crankshafts an equal spacing of explosions can be obtained with any desired angle between cylinder blocks, provided the crank throws are suitably spaced, but as long as the angle is either acute or obtuse the rocking couples will act in different planes and will not cancel out.

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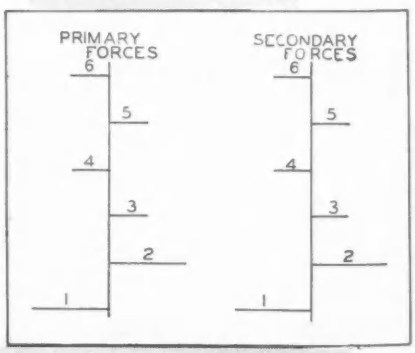
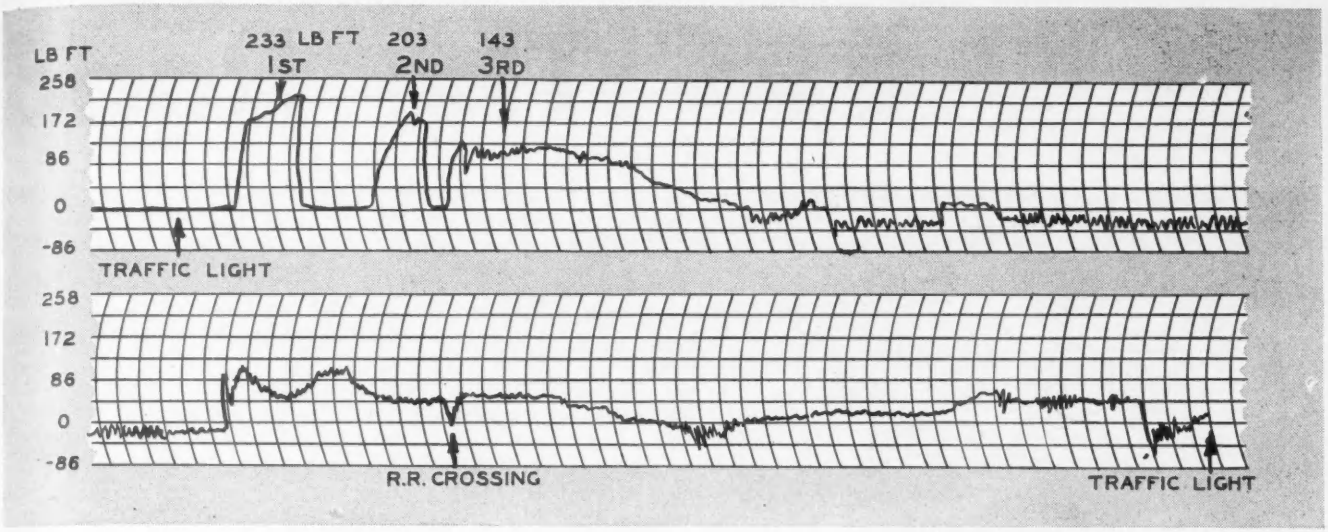


Fig. 6 — Plots of primary and secondary inertia forces in a horizontal opposed engine for the moment when cranks 1 and 2 are in outer dead center.



Recording tape of test drive in a small town. Note that the record returned precisely to zero when the load was removed from the propeller shaft.

Measuring Engine Torque under Driving Conditions

AN instrument to measure the torque of an automobile engine on the road, rather than in a laboratory on a dynamometer, has been developed in the experimental engineering department of Kaiser-Frazer Corp.

The accurate measurement of torque in rotating shafts has long been a difficult problem. The torquemeter designed and used by Kaiser-Frazer Corporation's experimental engineering department employs the principle of electrically measuring the torsional strain at the surface of the shaft itself. There is no transmission of angular deflection through uncertain clamping devices, no distortion from centrifugal forces even at very high speeds, and no error due to vibration.

The K-F torquemeter uses standard wire strain gages cemeted to a standard propeller shaft. They are oriented on the shaft and connected in a Wheatsone bridge circuit so as to respond to strains due to twisting of the shaft but to be insensitive to bending and longitudinal strains. Four slip rings are used to bring connections out from the gages to the amplifying and recording equipment.

The torquemeter was calibrated by securing one end and twisting the other end with torques of various magnitudes. The output of the strain gage bridge was amplified by means of a d-c amplifier and recorded on Brush magnetic recorder. The maximum gain of the amplifier gave a record readable to 4 lb-ft torque.

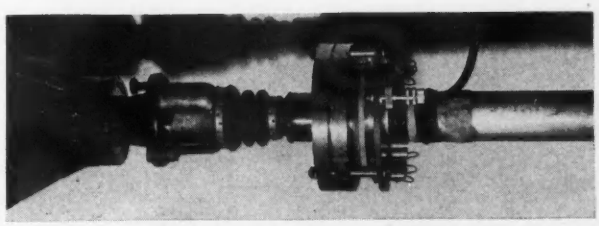
For test runs on Kaiser and Frazer cars, the regular propeller shaft is removed and is replaced by the one upon which the torquemeter is attached. Recording equipment is installed in the car. The amplifier and recorder are supplied with 115 volts a-c from the car's 6 volt system by means of an electronic converter.

A fifth wheel is attached to the car for accurate speed indication during road tests.

Tests were made, with the transmission gears in neutral, at high speeds over rough concrete to check bending strains. The record amplitude was zero and perfectly clean, indicating that such strains were cancelling out and that no spurious signals were being introduced by the brushes and slip rings. The outside brushes were operating at speeds of 92 fps at 80 mph.

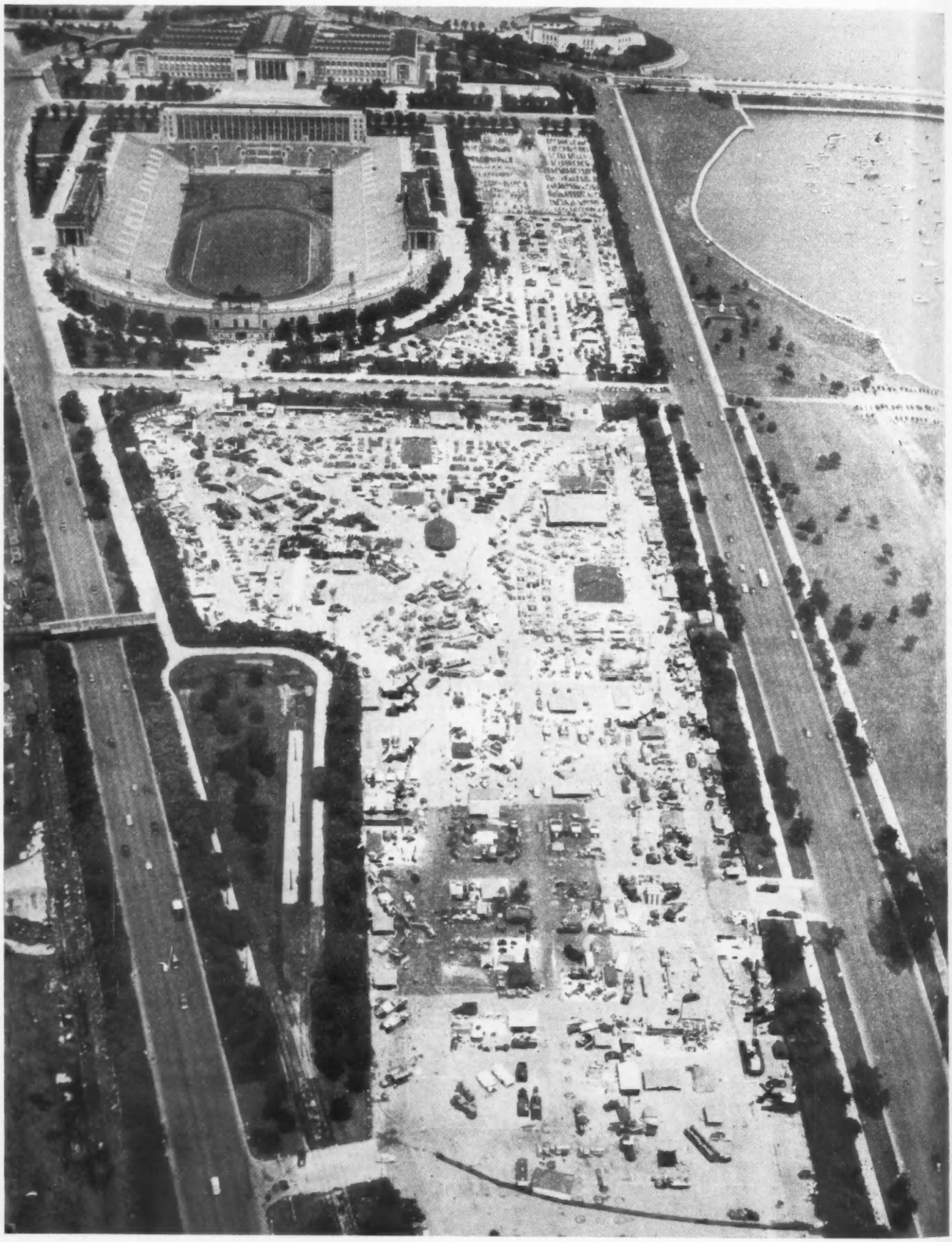
The torquemeter was used for road tests at speeds from 10 to 80 mph for a period of three weeks and was then recalibrated. Calibrations made at the beginning of the period and at the end checked each other within one per cent.

According to K-F engineers, results of tests in which the torquemeter was used have been extremely accurate and of more practical use than dynamometer tests because the torque results are from an engine with accessories and are measured directly from the rear wheels.



K-F torquemeter installed on propeller shaft.

The Road



Show of 1948

Huge Display of Road Building Equipment Presented in Chicago by American Road Builders' Association

By H. H. Roberts

IN SOME 1¼ million square feet of display space, more than 80 per cent of it out of doors, 330 makers of equipment and accessories for the construction and repair of roads and airfields displayed their wares July 16-24 at the 1948 Road Show of the American Road Builders' Association. Held at Soldiers Field, Chicago, where most of the $25 million worth of equipment could be shown, and in many instances demonstrated, the show marked a complete break with precedent in road shows. Formerly they were held indoors and in the wintertime. Now, after a lapse of eight years—the last Road Show was held in 1940—exhibits have grown in size and numbers to the point where no building has the floor capacity and ceiling height to house them. The exhibition was said to have been six times as large as the next biggest short-term industrial exhibit ever held anywhere in the world.

While more than 1000 railroad flat cars and gondolas were required to transport the equipment and displays to Chicago, hundreds of pieces of road-building machinery arrived at Soldiers Field under their own power, indicating the widespread trend toward greater portability in road construction and repair equipment.

Another widespread trend is toward greater size and speed of machines, and still more powerful engines. Examples shown were a 750-hp dozer and a 30 cu yd dragline bucket.

On the facing page is a birds-eye view of Soldiers Field showing general arrangement of exhibits.

Below is shown a close-up of a few of the hundreds of exhibits at the Road Show.

Despite the increased size and weight of equipment little effort on the part of the operator is necessary for its handling. In many instances hydraulic and air powered devices have taken most of the manual labor out of steering, braking, operation of clutches, etc. As demonstrated by a number of exhibitors, "push button" road building machines are now an accomplished fact.

Not only have the manufacturers increased the speed and improved the handling qualities of their products, longer life with less maintenance are additional features of their latest offerings. Better protection of working surfaces, improved facilities for lubrication, and particularly the extensive employment of anti-friction bearings in many locations where they were formerly considered an unnecessary refinement have added greatly to the useful life and reduced the upkeep expense of the new equipment.

Interest in the show was perhaps best demonstrated by the remarkable attendance. The anticipated mark of 100,000 was exceeded by the fourth day, and nearly doubled during the nine-day period.

The forty-fifth annual convention of the American Road Builders' Association was held concurrently with the show in Chicago. Among the 40,000 members of the highway industry who took part in the deliberations were representatives of Latin America, Mexico, Canada, Europe, the Orient and Africa.

Federal Motor Truck
Diesel Engine Specifications

Truck Model	D29M	D65MA	D65MA (Optional at extra cost)
Engine	Hercules DJXHF	Cummins HB-600F	Cummins NHB-600F
Type	Valve-in-head	Valve-in-head	Valve-in-head
Bore, in.	3¾	4⅞	5⅛
Stroke, in.	4½	6	6
Displacement, cu in.	298	672	743
Bhp, max	95 at 2600 rpm	150 at 1800 rpm	200 at 2100 rpm
Torque, lb ft, max	232 at 1500 rpm	490 at 700 rpm	540 at 1000 rpm
Main Bearings	7	7	7
Pistons	Zollner, heavy duty, aluminum alloy	Special alloy cast iron	Special alloy cast iron

Federal Diesel Trucks
Wheelbase, Cab to End Frame, and CA Dimensions

Wheelbase	Cab to End Frame (in.)			CA Dimensions (in.)		
in.	D29M-D29M2	D29MA	D65MA	D29M-D29M2	D29MA	D65MA
139	101	...	...	60½	...	...
146	107	...	...	67	...	...
155	119	119	...	76	76	...
162	...	...	108	...	...	74
167	143	143	...	88	88	...
174	...	...	120–143	...	...	86
180	167	167	...	101	101	...
191	...	...	167	...	...	103
194	191	191	...	115	115	...
209	...	...	204	...	...	121½

Capacities and Ratings of Federal Diesel Models

Model	GVW, (lb) as truck	GVW, (lb) with trailer	Nominal Rating (tons)
D29M	20,000	36,000	3 to 4
D65MA	30,000	60,000	6 to 8

Federal's

A POSTWAR line of Diesel-powered medium and heavy duty trucks just announced by Federal Motor Truck Co., Detroit, Mich., features two basic models and comprises four different trucks. Comparison of wheelbase options show that the Diesel models follow the same pattern as the gasoline-powered vehicles now in production. Federal also is introducing five new six-wheel gasoline-powered models which are described later in this article.

The new Diesel models, D29M and D65MA, the former having a nominal rating of three to four tons and the latter six to eight tons, are similar in outward appearance to the gasoline models. In fact the only noticeable difference is in the D65MA where the hood length is seven in. longer than on the corresponding gasoline model.

The three D29 Series trucks are powered with the Hercules DJXHF Diesel engine. The Model D65MA has the Cummins HB-600F Diesel engine as standard equipment. As optional equipment, at extra cost, Federal can supply the Cummins 200 hp NHB-600F Diesel engine where additional power is desired. In each case the engine models supplied incorporate certain basic changes in specifications to suit the special requirements of the vehicles.

Specifications of the Hercules and Cummins Diesel engines are given in tabular form. All engines are installed with a three-point non-metallic mounting. The Hercules engine features a counterweighted crankshaft with Tocco-hardened journals. The Cummins engines have Tocco-hardened crankshafts and are fitted with torsional vibration dampers. Main and connecting rod bearings on the three engines are of steel-back precision type, Hercules using a bearing alloy of high lead bronze composition, while Cummins has a copper-lead alloy. The fuel injection pump on the Hercules engine is of the plunger type, chain driven. In addition, the Hercules engine is fitted with a Bendix "Convac" vacuum pump, belt driven.

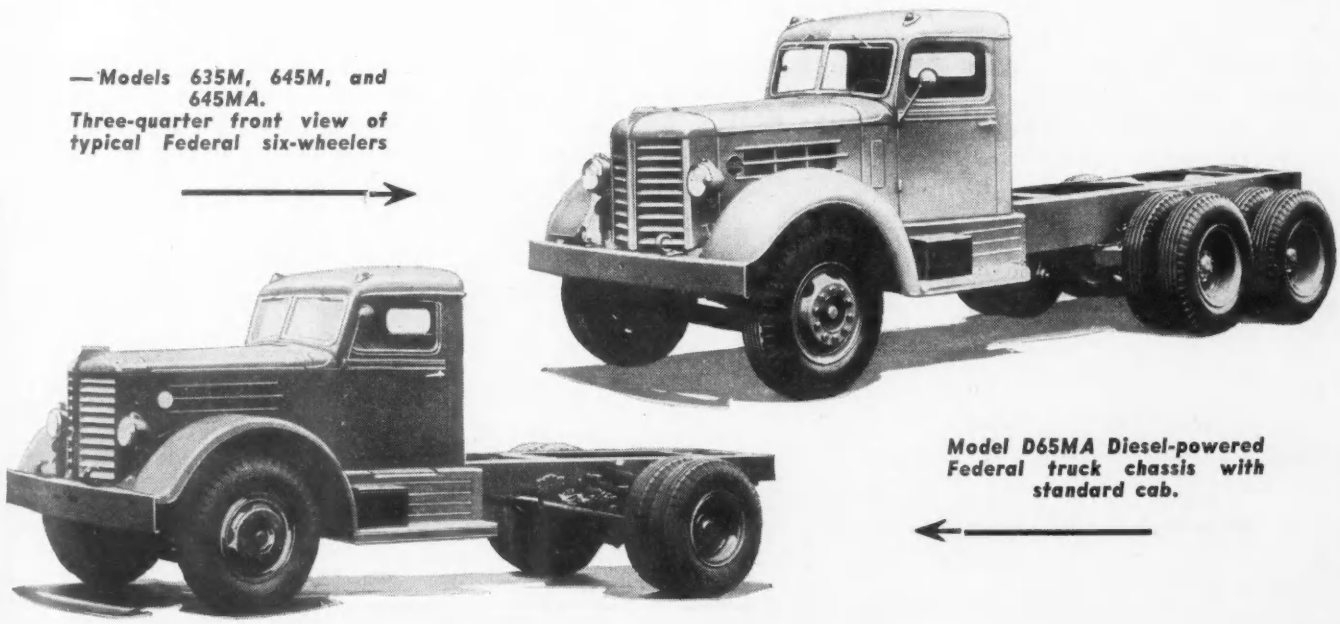
The Hercules DJXHF engine has nickel alloy intake valves, Silchrome exhaust valves; with intake valve diam of two in., and exhaust valve diam of 1-9/16 in.

(*Turn to page* 40, *please*)

Federal Six-Wheel Trucks — General Specifications

	629M	629ML	635M	645M	645MA
Rear Axle					
Make	Timken	Timken	Timken	Timken SD-3010-P	Timken SD-3010-P
Type	Tandem bevel SBD-1055-DPH	Tandem bevel SBD-1055-DPH	Tandem bevel SBD-1555-DPH	Tandem double Reduction	Tandem double Reduction
Ratio, std	6.17	6.17	6.83	8.27	8.27
Ratio, opt	7.04, 5.29	7.04, 5.29	5.57, 7.80	9.16, 10.22	9.16, 10.22
Clutch					
Make	Borg & Beck	Borg & Beck	Borg & Beck	Lipe	Lipe
Type	Single plate	Single plate	Single plate	Single plate	Single plate
Size, in.	12	13	13	14	14
Brakes—Front					
Make	Lockheed	Lockheed	Lockheed	Timken-Westinghouse	Timken-Westinghouse
Type	Hydraulic	Hydraulic	Hydraulic	Heavy duty air	Heavy duty air
Size, in.	16 x 3	16 x 3	16 x 3	16¼ x 3	16¼ x 3
Brakes—Rear					
Make	Timken DP	Timken DP	Timken DP	Timken P	Timken P
Type	Hydraulic	Hydraulic	Hydraulic	Heavy duty air	Heavy duty air
Size, in.	16¼ x 3 with Hydrvac booster	16¼ x 3 with Hydrvac booster	16¼ x 4 with Hydrvac booster	16½ x 6	16½ x 6
Transmission—Main					
Make	Clark 205-VO	Clark 205-VO	Clark 270-VO	Clark 270-VO	Clark 270V-5
Type	5-speed overdrive	5-speed overdrive	5-speed overdrive	5-speed overdrive	5-speed direct
Transmission—Auxiliary					
Make					Spicer 6231-B
Type					3-speed
Torque Divider					
Make	Timken T-70-3	Timken T-70-3	Timken T-70-3		
Ratio	1.22, 1.68	1.22, 1.68	1.22, 1.68		

New Diesel and Six-Wheel Trucks



—Models 635M, 645M, and 645MA. Three-quarter front view of typical Federal six-wheelers

Model D65MA Diesel-powered Federal truck chassis with standard cab.

Gasoline Engine Specifications for Federal Six-wheel Trucks

Truck Model	629M	629ML	635M	645M, 645MA
Engine	Hercules JXDF	Hercules JXLDF	Continental T-6371F	Continental T-6427F
Type	L-head	L-head	Valve-in-head	Valve-in head
Bore, in.	4	4	4⅛	4 5/16
Stroke, in.	4¼	4½	4⅝	4⅞
Displacement, cu in.	320	339	371	427
Bhp, max	112 at 2800 rpm	126 at 2800 rpm	133 at 2600 rpm	155 at 2600 rpm
Torque, lb-ft, max	250 at 1400 rpm	272 at 1400 rpm	290 at 1400 rpm	342 at 1400 rpm
Main Bearings	7 high lead bronze	7 high-lead bronze	7 Clevite 77	7 Clevite 77
Pistons	Zollner aluminum alloy			
Exhaust Valve	alloy steel	Rotator type Eatonite faced	Roto type Bright Ray Stellite faced with exhaust valve inserts	Roto type Bright Ray Stellite faced with tungsten exhaust valve inserts
Governor	King Seeley velocity type		Mallory mechanical	
Carburetor				
Make	Carter	Zenith	Zenith	Zenith
Type	Down-draft	Down-draft	Down-draft	Down-draft
Size, in.	1½	1¾	1¾	2

(all fitted with oil bath air cleaners)

The Cummins engines are fitted with alloy steel exhaust valves and Stellite-faced exhaust valve seats. Crankcase oil capacity on the Hercules engine is nine qt, including the oil filter capacity; on the Cummins, 20 qt.

Since the combinations of axles and transmissions and other details vary from one model to another and, moreover, vary in accordance with the requirements of individual truck operators, it is not practical to list the variety of chassis options offered in this line. Generally speaking the D29 Series has chassis details quite similar to those of the 29 Series gasoline models. The D65MA, on the other hand, while similar to the gasoline models offers many modifications and optional axle and transmission combinations to suit the requirements of heavy duty Diesel service.

The D29 Series features the Hotchkiss drive system. Radius rod are used on the D65MA. As standard equipment, the D29M has the Timken hypoid rear axle and five-speed direct drive transmission; the D29M2 is provided with a Timken two-speed hypoid helical double reduction rear axle, and five-speed direct drive transmission; while the D29MA uses the Timken hypoid gear rear axle in combination with a five-speed direct drive transmission and a Brown-Lipe three-speed auxiliary transmission.

The D65MA offers as standard equipment the Timken S-200P hypoid-helical, double reduction rear axle in combination with a Spicer 7741 four-speed transmission and Spicer 703-F three-speed auxiliary transmission.

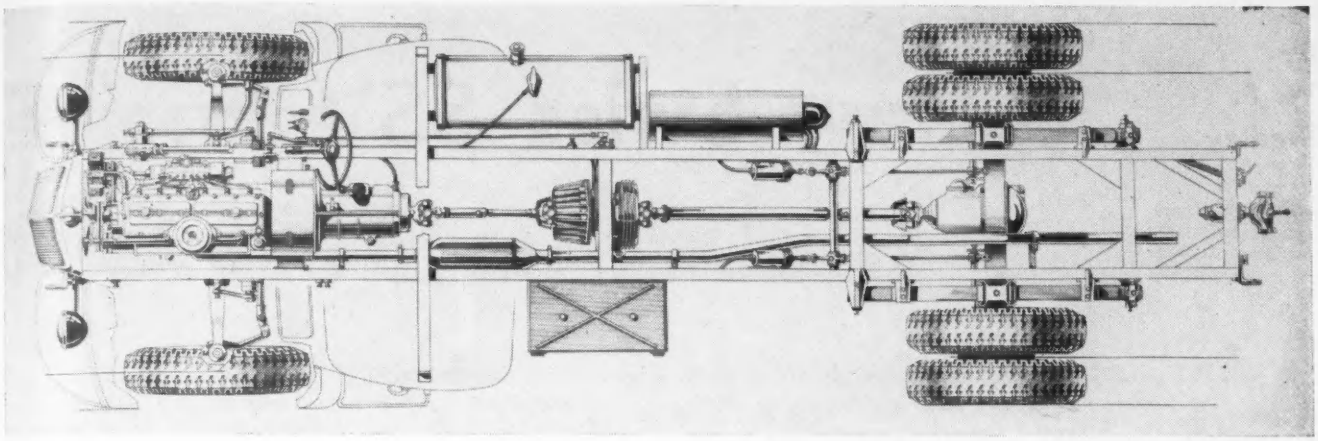
The electrical system on all models follows the Federal practice of having three separate sets of wiring harness with one fuse for each circuit and three spares. On the D65MA the electrical system has a 12-volt, 600-watt Delco-Remy generator; all other models use a 12-volt, 300-watt Delco-Remy generator. All models are equipped with a 24-volt D-R starter. Each model is fitted with four, 19-plate, 6-volt batteries.

The D29MA models are equipped with the Gemmer triple tooth worm and roller type steering gear with a ratio of 20.4 to 1 on the D29M; 28.4 to 1 on the D65MA.

The front brakes on the D29M Series are Lockheed hydraulic while rear brakes are Timken dual primary hydraulic with Hydrovac vacuum self-contained power booster unit. Brakes (*Turn to page 67, please*)

GVW Ratings, Wheelbases and Maximum Road Speeds of New Federal Six-Wheel Models

Model	GVW (lb)	Wheelbase (in.)	Road Speed High Range (mph)	Road Speed Aux Overdrive (mph)
629M, 629ML	27,500	163, 181, 199	51.2	
635M	36,000	167, 185, 203	45.4	
645M	38,000	167, 179, 185, 203, 215	47.7	
645MA	38,000	179, 185, 203, 215	37.5	43.7



Chassis of the new Lancia truck.

New Lancia Truck

Lancia & Co. of Turin, Italy, has placed on the market a new heavy duty Diesel truck with the following specifications:

Overall length — 322 in.; Overall width—98.4 in.; Road clearance—13.6 in.; Turning radius — 27 ft. 3 in.; Weight of empty truck—13,860 lb; Load capacity—8.5 tons.

The truck is powered by a 864 type six-cylinder Diesel engine with direct injection, working on the four stroke principle. The cylinder bore is 4.25 in. and the stroke 5.9 in. This engine develops 122 hp at 2000 rpm. The crankcase is aluminum alloy, the cylinder block cast iron. The fuel injection unit is located on the right side of the engine. The engine has 12 intake and 12 exhaust valves. The injectors are of the closed type mounted on the central part of the combustion chamber. They have four 0.010 in. diam holes at 125 deg. The transmission has eight forward speeds and two reverse speeds.

In the braking system there is an air brake of the Sabif type acting on all wheels as well as on the drive shaft, and a mechanical emergency brake with lever hand control acting on the drive shaft only. The truck is equipped with a 12 volt electrical system.

Shipments of Steel to Automobile Industries, 1941-'46-'47

Types of Steel	Shipments to Automobile Industries* in Per Cent of Shipments to All Industries			Shipments in Tonnage to Automobile Industries*			Shipments in Tonnage to All Industries		
	1947	1946	1941	1947	1946	1941	1947	1946	1941
Ingots, Billets, Slabs	8.11	9.279	6.162	434,692	334,202	375,593	5,363,091	3,601,638	6,095,237
Wire Rods	2.009	2.429	6.382	20,062	24,934	90,190	998,474	1,026,504	1,413,128
Structural Shapes	1.065	.900	0.637	47,286	31,325	31,579	4,438,769	3,479,683	4,960,822
Plates	5.762	5.713	3.906	378,223	251,527	230,128	6,564,443	4,402,890	5,890,837
Hot Rolled Bars	21.605	21.295	25.192	1,931,956	1,542,548	1,995,530	8,942,000	7,243,523	7,921,370
Cold Finished Bars	16.265	14.786	20.830	269,568	224,297	292,084	1,657,353	1,516,969	1,402,195
Tool Steel	1.490	1.353	11.026	1,325	1,305	18,686	88,949	96,391	169,469
Pipes and Tubes	1.769	1.726	1.567	112,455	82,715	92,952	6,358,321	4,791,094	5,933,309
Wire Products	5.450	5.008	6.529	238,096	170,115	250,983	4,368,610	3,396,978	3,844,325
Black Plate	1.676	1.133	1.030	11,131	10,302	4,971	823,030	909,516	482,378
Tin and Terne Plate	.372	.276	0.239	13,793	7,833	9,005	3,711,565	2,833,830	3,768,206
Sheets and Strip	30.516	26.535	32.712	5,890,673	3,935,111	5,450,546	19,303,845	14,829,598	16,662,039
Other Products	.....	.....	0.619	.....	.....	44,497	6,156,465	4,944,807	7,184,277
Total Shipments	13.594	12.466	13.521	9,349,260	6,616,214	8,886,744	68,774,915	53,073,421	65,727,592
Less shipments to members of the industry for conversion or resale	.....	.....	.....	75,897	59,015	5,233	5,717,765	4,297,889	3,753,971
Net Total	14.706	13.444	14.331	9,273,363	6,557,199	8,881,511	63,057,150	48,775,532	61,973,621

NOTE:—The above table was compiled from data supplied by the American Iron and Steel Institute.
*—Includes manufacturers of passenger cars, trucks and other commercial vehicles, parts and accessories suppliers and independent automotive forgers. Tractor manufacturers are not included.

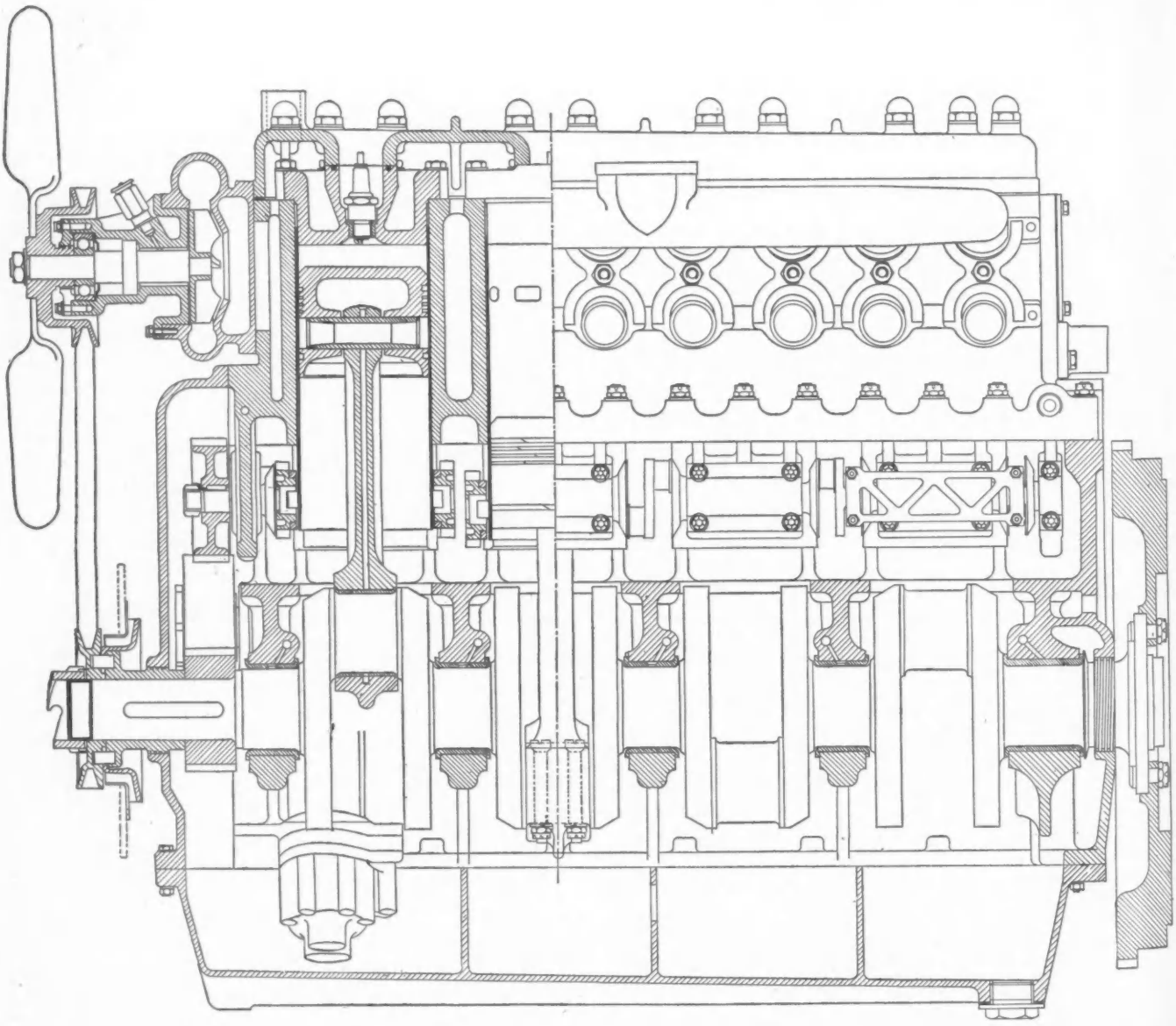
By
W. F.
Bradley

Special European
Correspondent for
Automotive Industries

New Swiss SSV Engine Has Thin Split

A THIN, light weight fully split sleeve with a rectilinear movement and a stroke of only 0.433 in. characterizes a new single sleeve valve engine designed and produced by Ernest Schmid, president of the S.R.O. Ball Bearing Co., of Oerlikon, Switzerland. To date two engines have been produced. One of these with four cylinders has a 2.362 in. by 3.54 in. bore and stroke (62 cubic in. displacement) and the other also with four cylinders has a 3.537 in. by 4.12 in. bore and stroke (162.8 cubic in. displacement). The smaller of the two has completed all its bench tests, including 300 hr without dismounting, and has developed 43 hp at 5000 rpm. Because of the very low inertia forces in the valve gear, the usual limitations of a sleeve valve engine are said to be absent and further tests are about to begin at high rpm.

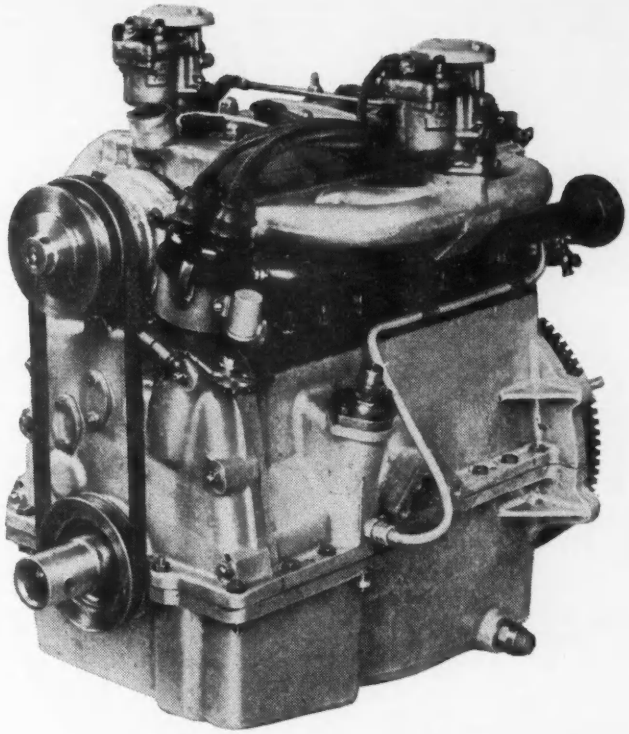
So far as the basic construction is concerned, the engine is conventional. The crankshaft is mounted in an aluminum crankcase, with three main bearings for the smaller model and five for the bigger engine. The connecting rods are of Hiduminium RR 66.



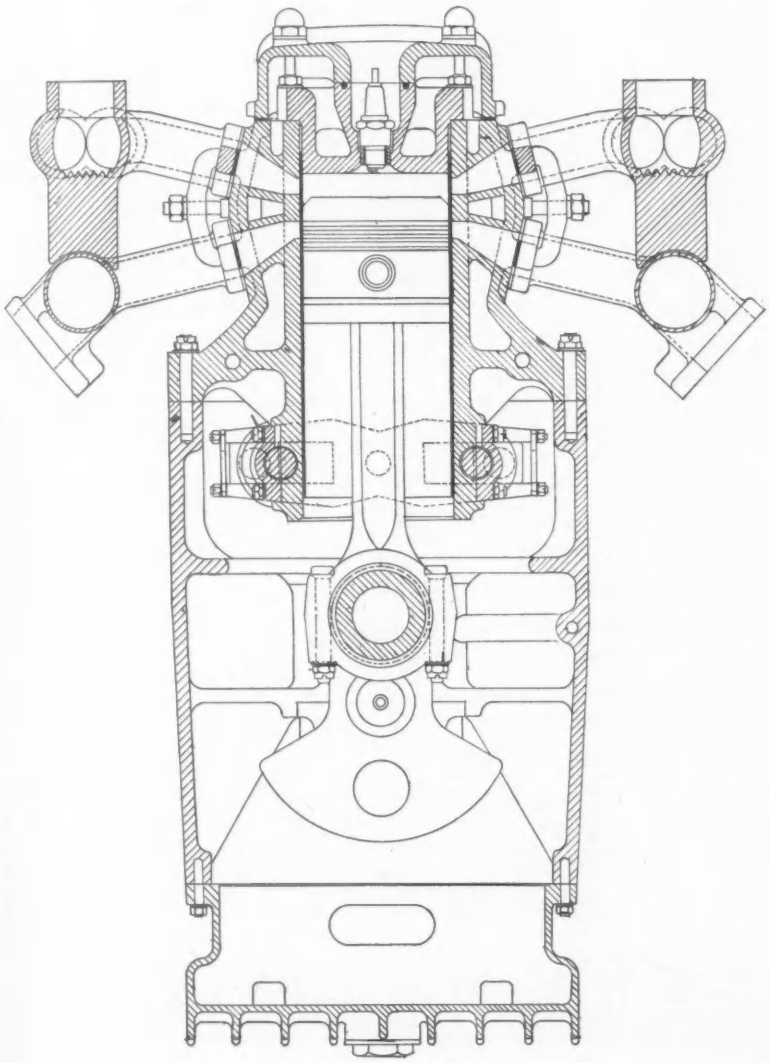
Features Sleeve Valve

Pistons are aluminum alloy with full floating wrist pins.

The use of a split, elastic sleeve has led to the adoption of a cast bronze cylinder block, for the design necessitates a small variation in the co-efficients of expansion of sleeve and cylinder. Some engines are being built with electron and aluminum alloy blocks. The weight of the former is only 16.5 lb for the 62 cu in. engine, thus effecting a considerable saving in the total weight of the power plant. American production engineers who have examined this engine are reported to be of the opinion that satisfactory results from the expansion standpoint can be obtained with cast iron.



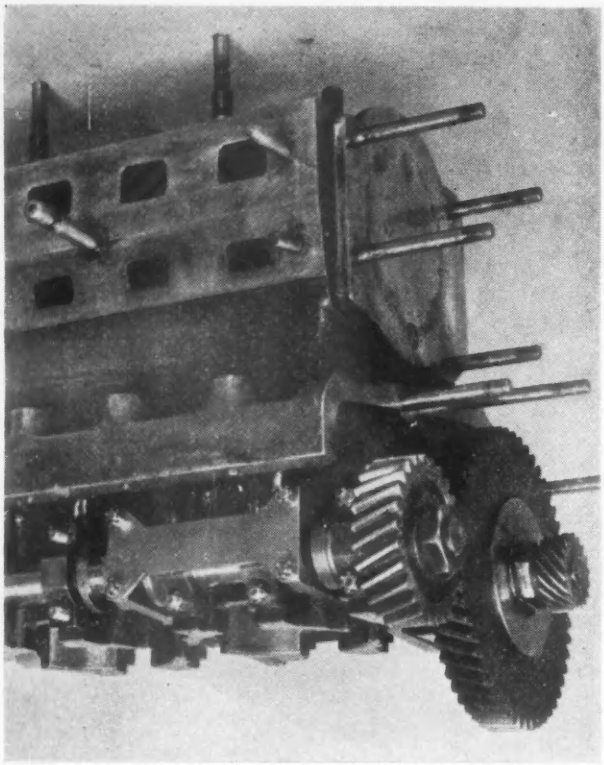
Three-quarter front view of the Schmid engine showing the two carburetors and the intake and exhaust manifolds on the left side. There is a similar set of manifolds on the right side of the engine.



As shown in the illustrations, the cylinder has diametrically opposed dual ports, for intake and exhaust respectively, the former being above the latter, the dead land between the two being water jacketted. All ports have an inclination of 10 deg from the horizontal. On the small engine the port area is 18 per cent of the piston surface. Since intake and exhaust take place on both sides of the engine, there are two carburetors and two intake and two exhaust manifolds.

The split sleeve, which engages the full length of the cylinder barrel, is of chrome-carbon steel, heat treated to hardness number C61, and is formed with two lugs on its base and weighs 0.59 lb. As seen from the illustrations, there are no rings on the sleeve or in the cylinder head and the piston rings do not pass over the ports. In its upper position the inlet ports are uncovered by the openings in the sleeve. On its down stroke the ports on the sleeve are on the dead land, and during practically the whole

Longitudinal section of Schmid engine is shown on the opposite page. On this page is a transverse section of Schmid engine.

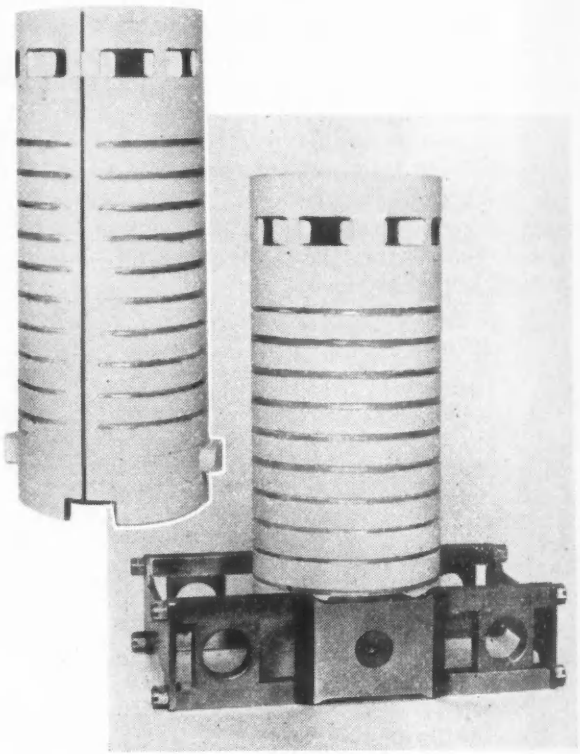


This photo shows the split sleeve operating mechanism and the timing gears assembled to the cylinder block.

of the compression and firing strokes the sleeve remains stationary. Continuing its down stroke it uncovers the exhaust ports. The travel of the sleeve is shown on the diagram.

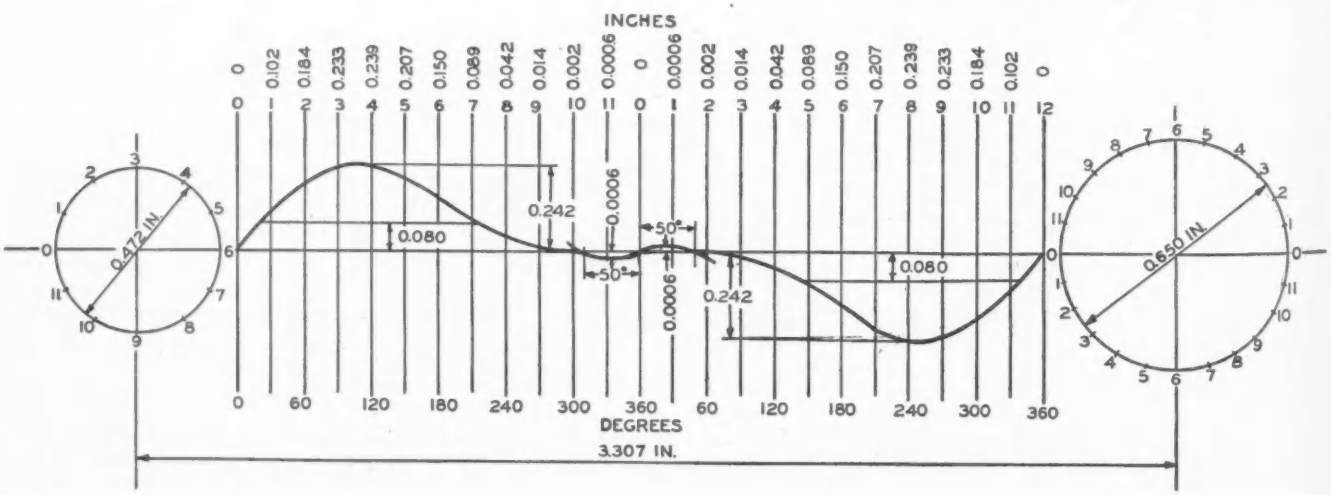
The sleeve is fitted in the bronze cylinder with a gap of 0.0012 in. but in the light alloy cylinders this gap will be reduced. The standard sleeve has a thickness of 0.039 in. except near the ports and on the upper end, where this thickness has been slightly reduced. Sleeves have been made and operated with a thickness of only 0.019 in., but the thicker sleeve is considered preferable.

The whole success of this engine depends on the ability to grind accurately both internal and external surfaces of the flexible sleeve. This is accomplished by a patented system of mounting the sleeve on a perforated mandrel and holding it to this by means of vacuum. The process is reversed, the sleeve being expanded in a muff, by vacuum, while the inner surface is being ground. On the first engine the sleeves have been machined out of solid material, but for production the builder contemplates producing them by rolling and electrically welding the two lugs on them. Lubrication is assured by a slightly recessed pocket on the base of the sleeve and inclined oil grooves at intervals along its entire length. This is found sufficient without specially directing oil onto the walls of the sleeve. (*Turn to page* 82, *please*)



The insert shows split sleeve used on the Sschmid engine. The lower view shows the split sleeve with operating mechanism assembled to it.

(Below) Diagram showing the travel of the sleeve for one complete engine cycle.



AIRBRIEFS

By ROBERT McLARREN

KELLETT PRIZE

The intense interest of such aircraft interests as Fairchild and Howard Hughes in the assets of insolvent Kellett Aircraft Corp., now undergoing reorganization in bankruptcy court, has now been revealed as the potentially lucrative XH-17 research and development contract Kellett holds from the Air Force. This project is for the development of a jet-driven rotor for a "flying crane" type helicopter, which could be attached to any bulky article, such as a tank, truck or cargo load and lift it over a river, rough terrain or enemy obstacles. General Electric Corp. is developing the power unit, which consists of two J-35 turbojet engines to be mounted in a fuselage structure with the jet efflux being ducted up through the rotor head, out along the blade leading edges and out jet nozzels at the tips. Advantages of the system is its elimination of torque, rendering the "flying crane" application ideal.

Kellett also holds an Air Force contract for the flight tests of the XH-10 twin-rotor helicopter design, which has been flying for more than a year. Both Fairchild and Hughes have submitted reorganization and refinancing plans to U. S. District Court in Philadelphia. Air Force has indicated that both firms would be acceptable as receivers of the two contracts.

DOUGLAS METALS DIVISION

Donald Douglas has formed a new company division for the fabrication of pressed metal products for which there exists a large potential on the West Coast. The new group would comprise an autonomous division of the company under the direction of Harry Woodhead, former Convair president and long-time metals products executive. Douglas insists that the new division has nothing to do with the company's aircraft present or future, but was formed simply to meet a current market situation with great appeal. The company has been engaged in the production of automobile fenders, radiator shells and other pressed metal products since the end of the war on a subcontract basis. Douglas has already received a substantial subcontract for the production of Boeing B-50 fuselage assemblies.

THIRD-MAN BATTLE

Civil Aeronautics Board ruling that all aircraft of more than 80,000 lb gross weight must have a flight engineer by December 1 has met with vociferous objections by most airlines operating eligible aircraft in domestic service (overseas routes have used them continuously since certification). The battle centers not so much around the fundamental desirability of a third-man-in-the-cockpit per se as it does about his presence in the Douglas DC-6, which was not designed for such a crew member. Major attention was devoted to the DC-6 cockpit layout for a pilot and co-pilot and modifications placing the engine controls and others in a new location would require several million dollars worth of effort. American Airlines, which operates the largest DC-6 fleet, has taken the lead in the battle. United Air Lines, more philosophically, has already opened a school for flight engineers. The Boeing Stratocruiser, Lockheed Constitution, Convair XC-99 and other heavy transports have been especially designed for flight engineer operations.

BRITISH COMPROMISE

The battle that has raged in the House of Commons over British Ministry of Supply purchases of Boeing Stratocruisers and Lockheed Constellations in the face of a "Buy British" policy in all other fields has finally been resolved with the announcement that 20 Canadair DC-4M tranports have been ordered and the Stratocruiser contract cancelled as well as an additional Constellation order being dropped. The Canadian-built and British-powered (four Rolls-Royce Merlin engines) aircraft are modified Douglas DC-4 and DC-6 assemblies combined into a single aircraft. Trans-Canada Airlines has been operating the DC-4M since shortly after the end of the war on both Canadian and trans-Atlantic routes with an excellent record of reliability.

FLYING WING POSER

The subcontracting of the entire production quantity of 30 Northrop B-49 jet Flying Wing bombers to Consolidated Vultee's Fort Worth, Tex. plant has raised some eyebrows. The question immediatly arose: What does Northrop get out of the deal? The Air Force reply is: Just what they put into it. Although there will be no license fees, no "double profits" and no patents involved, Northrop stands to show a substantial profit on the deal. Northrop will be in complete charge of production planning, tool design and technical supervision of the program, Convair simply supplying plant space and labor plus the necessary administrative management. Thus, both companies will benefit from the arrangement. It was hastily pointed out, incidently, that neither Floyd Odlum nor LaMotte Cohu have any remaining financial interest in Northrop Aircraft, although they were both substantially invested in the formation and early development of the company. John K. Northrop, personally, has never been particularly interested in the quantity production of his deesigns, preferring the design and development phases of the work above all others.

ATOMIC POWER

According to the NEPA (Nuclear Energy for Populsion of Aircraft) project, everything is all set, insofar as the uranium fission as a source of heat is concerned, for the atom-powered airplane. All that remains now is the handling of this heat as a conventional engineering problem. Andrew Kalitinsky, NEPA chief engineer, believes that all of the present types of power plants can be adapted for nuclear propulsion. For example, the heat could be used to generate steam to operate a steam turbine-propeller unit. In the turbojet engine, the heat could accelerate air, replacing the present combustion chambers with the nuclear reactor. In the ramjet, air would enter the nose, pass through the reactor where it would be heated and then be ejected as a high speed jet from the nozzle. In a rocket, liquid hydrogen could be pumped through the reactor where it would be vaporized and heated to a high temperature and passed through the rocket nozzle. The problem now is simply one of handling the heat generated by the reactor and thermodynamic engineering skill should provide answers in the next few years.

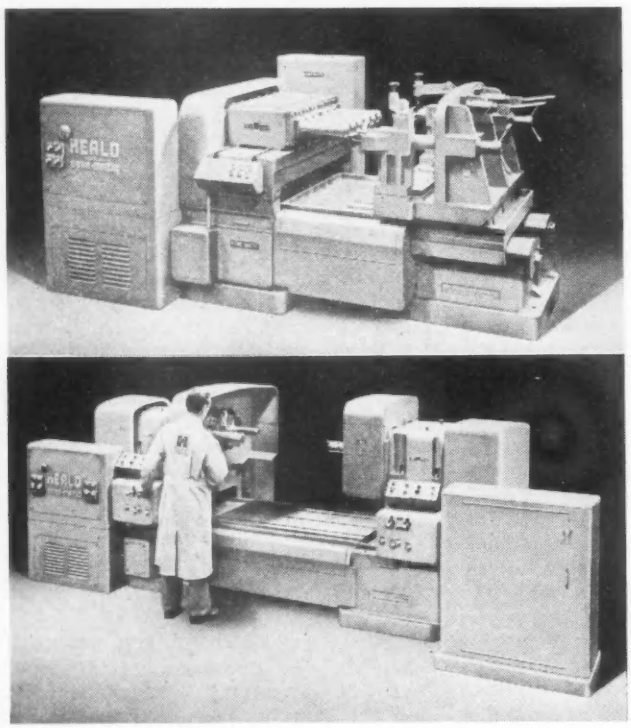
NEW Production and Plant EQUIPMENT

for additional information regarding any of these items, please use coupon on page 56.

M-29—New Series Bore-Matics

The Heald Machine Co., Worcester, Mass., has developed a new series of Heald Bore-Matics—largest in the new Heald line. Designed for precision boring, facing, turning, chamfering or grooving on heavy work such as workheads, tailstocks, cylinder blocks, connecting rods, and large pump and compressor bodies, the tables of these models are built only 22 in. from the floor for ease of loading from conveyor or overhead crane.

All models are basically the same machine except for length. Models



Heald Model 521 single end machine, and . . . Heald Model 522 double end machine, for precision finishing large work

double end machines respectively, Model 524 being single end with a long base for extra capacity.

Seven or more individual boring heads or a special multi-spindle head 521 and 522 are standard single and unit can be installed on each bridge. Roughing and precision finishing can be performed at a single setting.

The massive one-piece base casting has widely spaced V and flat ways extending nearly its entire length. Lubricated by a separate controlled pressure system, ways are also protection covered at all positions of the table.

Boringheads, lubricated for life, run extremely cool. Up to ten or more hp is available at each end of the machine for heavy roughing cuts and higher speeds when using multiple heads.

Outboard tank and drive eliminate effects of heat and motor vibration. Motors are belted to heads through direct V-belt drives.

Hydraulic feeds remain uniform throughout the day regardless of oil temperature changes. A new constant pressure dump valve automatically furnishes only the amount of oil required during each phase of the entire machine cycle.

Simple control settings permit different rates of "in" and "out" feeds for two-way boring. Sensitive brake adjustments permit instantaneous action at predetermined points in the cycle. The brake is self-compensating for band wear. All rotating tools are the same hand.

M-30—Air Press And Work Feeder

Mead Specialties Co., Chicago, Ill., have brought out an air press and rotary work feeder with a universal base for innumerable light staking,

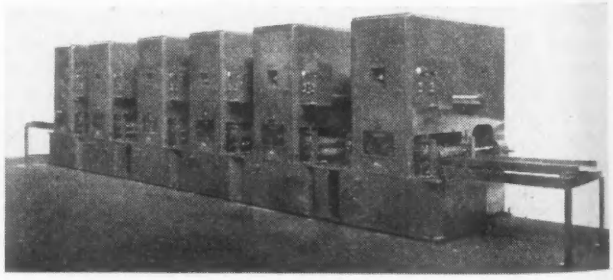
Mead air press and rotary work feeder

forming, pressing, and assembly operations. The vertical stand of heavy cast iron is accurately machined to give perpendicularity between ram and table, and to provide high rigidity under working pressures. Bolt holes are provided in the stand for attaching it to the universal base. Base may be drilled and tapped ½ in.—13 in desired location. Mounting holes for the cylinder are also laid out and drilled by the user according to height desired. Maximum opening between ram and universal base is 7½ in.

M-31—Abrasive Belt Grinders

For flat polishing of ferrous and non-ferrous metals and other materials, the Hill Acme Co., Cleveland, Ohio, has placed on the market a line of 2-roll vertical abrasive belt grinding and polishing machines.

The machines are available in three general types: (1) Strip Type for processing strip material in coiled form; (2) Plate or Bar Type incorporating feed or pinch rolls for conveying material under the polishing head; and (3) Sheet Type with



Battery of 6 Hill Acme 24 in. 2 roll vertical abrasive belt grinding and polishing machines for processing automotive bumper bar stock

reciprocating hydraulic table drive.

Machines are built in widths up to 60 in. with use of welded steel in all principal parts.

Endless coated abrasive belts 10 ft 6 in. long, instead of the 20 ft 3 in. belts used on previous models, reduce hazards of damage and excessive time required for changing the longer belts.

The 2-roll vertical polishing head is the same for all three types of machines, and covers basically a dynamically balanced upper steel idler roll and a lower rubber covered contact or work roll over which the abrasive belt travels. This rubber covered contact driving roll eliminates slippage of the abrasive belt. A steel billy roll located directly below the driving contact roll is raised and lowered through the employment of air cylinders. A pneumatic belt-centering device assures positive tracking of the belt, irrespective of dust, moisture or other disturbing conditions.

Both the plate and strip type machines are adaptable for multi-stage processing, whereby a battery of machines can be placed in series for continuous polishing.

No separate grinding machine is required to redress the work roll. The roll can be redressed in place at running speed by using a steel redressing plate furnished standard equipment.

M-32—High Production Lapping Machines

High production lapping is now claimed commonplace by use of the Lapmaster, placed on the market by the Crane Packing Co., Chicago, Ill. With it, lapping to within 0.0000116 in. is being done under severe production schedules on such materials as cast iron, ni-resist, bronze, stainless steel, carbon steel, carbon, Stellite, and various ceramics.

A feature is the continuous self-conditioning of the lapping plate which affords controlled and continuous accuracy in flat, concave, and convex lapping to within less than one light band per inch of work surface, and holding micro finishes of one to three RMS.

Operation is as follows: After the work has been placed in the work holders the machine is started by turning on switches to the lapping plate motor and to the compound agitator. When the lapping plate motor is started the solenoid compound valve opens allowing the compound to run down the feed wire to the lapping plate, where it is evenly distributed to the surface by the rotation of the work holders.

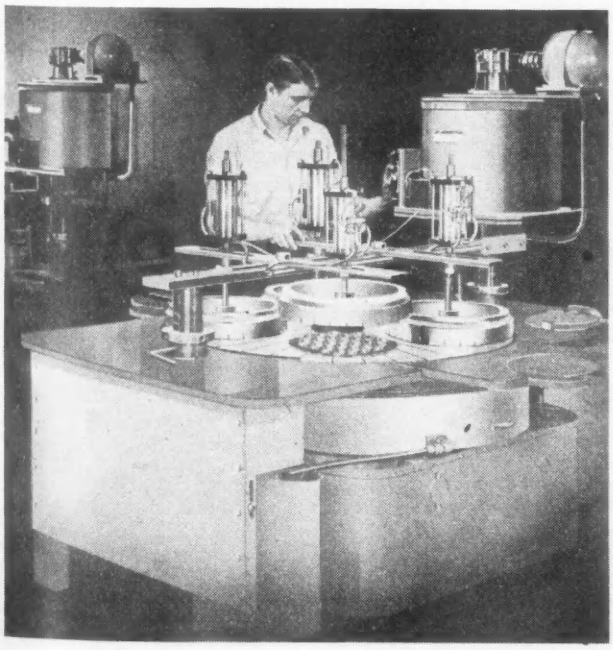
The wear rings and work holders rotate within their orbit on the face of the lap. The lap rotates under the work, as do the wear rings. The work is free to rotate on its own axis in the work holders. This free motion generates the uniform abrading action so essential to uniform concave, convex or flat lapping for extreme tolerances.

Use of the Lapmaster is not limited to long production runs, as work placed on it at any one time may be of different sizes, shapes and heights.

Model 48 is one of six models ranging from 12 in. to 72 in. lapping capacity.

NEW Production and Plant EQUIPMENT

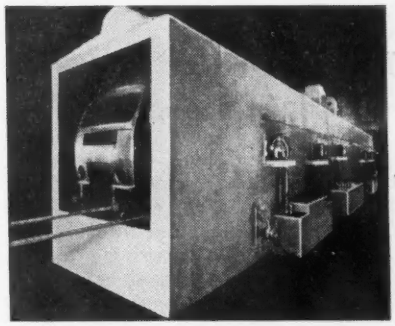
For additional information regarding any of these items, please use coupon on page 56



Model 48 Lapmaster of the Crane Packing Co.

M-33—Truck Cleaning Machine

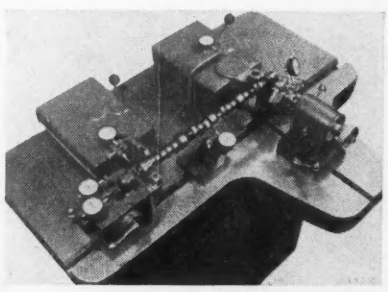
N. Ransohoff, Inc., Cincinnati, Ohio, recently designed and built this machine for cleaning and rust-inhibiting truck bodies before painting. The machine is 80 ft long and performs 12 operations automatically. The cab shown in the illustration weighs approximately 950 lbs and the machine cleans a total load of approximately six tons per hour. Sprays from top, bottom and both sides automatically clean the cabs and they are rinsed, dried and surface prepared for painting as they pass through the machine on dollies 38 ft wide.



Ransohoff machine cleans truck bodies.

M-34—Gear And Cam-Shaft Checker

A combination gear and cam shaft checker, designed by Red Ring en-



Red Ring gear and camshaft checker

gineers, National Broach and Machine Co., Detroit, Mich., is now in use by one of the large automotive manufacturers to check the oil pump and distributor drive gear, the mounting flange and dowel pin for the timing gear, the bearings, journals and the base circles of the cam lobes. In operation, the cam shaft is laid on two journal bearing support blocks and rotated by hand, while readings are taken. The distributor drive gear is tested for composite errors and eccentricity by rolling it with a master gear. Tooth to tooth spacing is checked by one of the standard Red Ring gear checking heads. The timing gear mounting flange is indicated for runout on both faces and the dowel pin in this flange is checked for its relationship to one of the cam lobes. One of the special heads is used for indicating runout on the two center bearing journals and on the base circles of each of the cams.

M-35—Driller For Clutch Housings

A machine which drills and line bores cross shaft holes in 70 different sizes and types of clutch housings has been designed and built by Snyder Tool & Engineering Co., Detroit, Mich.

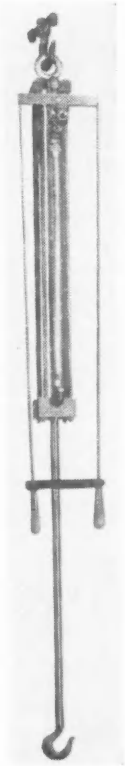
Four hydraulically actuated Snyder standard slide units are mounted horizontally and opposed in pairs, front and rear. Slides move on hardened and ground ways, one flat, the other V-type. The two rear slides are equipped with single drill heads and are used to drill the cross shaft holes. The front slides are equipped with Parker boring spindles for finish line boring of the holes. These front spindles have micrometer adjustments permitting precision setting of the finish boring tools, which are tungsten carbide.

Slides are lubricated from a pump and tank unit mounted at one end of the machine. Slide feed rates are controlled by individual feed control valves. Estimated production is 65 pieces an hour at 80 per cent efficiency. Floor space required is 175 by 75 in.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56.

M-36—New Safety Air Hoist

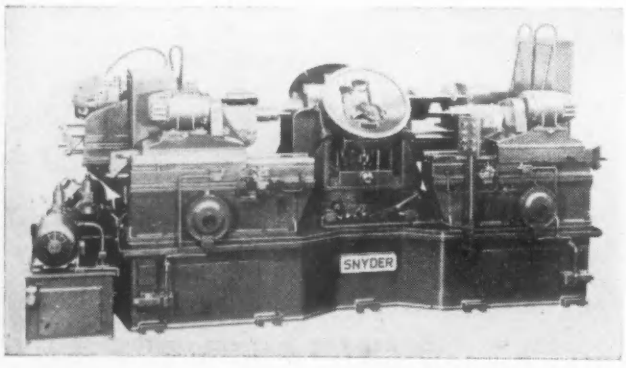


Safety air hoist developed by the Miller Motor Company

A safety air hoist that will not drop its load, even if the air line breaks or the air supply fails—whether it is lifting, lowering, or stopped at the time of pressure loss—is a recent development of Miller Motor Co., Chicago, Ill.

All-metal fittings and piping, steel fabricated heads and caps, honed non-corrosive tubing, leakproof seals, hard chrome plated piston rod with dirt wiper, and shock absorbing tie rods, combine to suit the hoist to factory conditions.

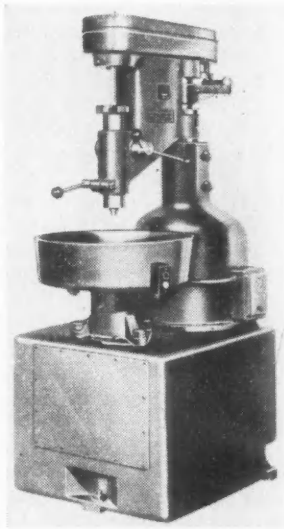
Hoists are stocked in sizes 3¼ in. bore by 36 in. stroke, and 4 in. bore by 36 in. stroke. Hoists are made to order in any stroke length, in bores of 3¼, 4, 5, 6, 8, 10, 12, and 14 in.



Snyder machine for operations on 70 sizes and types of clutch housings

M-37—Flat Surface Finisher

Micromatic Hone Corp., Detroit, Mich., is manufacturing a new line of machines under the trade name Microflat for finishing flat surfaces.



Micromatic flat surface finisher

In a series of six models are two types of Microflat machines both using either bonded or loose abrasives. One machine (illustrated) finishes flat surfaces regardless of shape or size of the part. The other machine finishes two opposite sides of the parts simultaneously within 0.0001 in. for parallelism. One or many parts may be processed simultaneously. Surfaces produced are optically flat within one light-band and can be held to a finish of one microinch R.M.S. or less if desired. The equipment finishes any material from soft copper, to quartz, or nitroalloy.

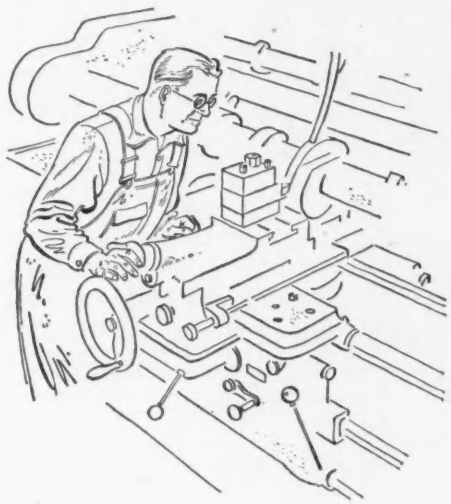
M-38—Portable Hydraulic Press

A new compact, hand-operated portable hydraulic press for either

(*Turn to page* 58, *please*)

Studebaker portable hydraulic press

"I Like the UNIFORMITY of Inland Steel"



THE MEN WHO WORK WITH INLAND STEEL KNOW ITS QUALITY

Experienced machine tool operators know how easily production can be slowed . . . quality of product finish lowered . . . tool life reduced . . . when the steel they work varies in chemical composition or mechanical properties. These men prefer steel that's *uniform.* That's why they like steel *made by Inland.* Uniform source of raw materials . . . uniform steelmaking procedures using the same modern equipment . . . uniform workmanship—made possible by Inland's completely integrated, closely knit plant —explain why the uniformity of the Inland steel received today will be the same as that received last month . . . or last year. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

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NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 56.

P-42—Mobile Counting Scales

Counting and weighing scales, enabling one man to handle bulky or heavy material by merely rolling the scale over objects to be weighed or counted, are being revealed by the National Scale Co., Springfield, Mass. The scales also eliminate time-consuming transportation of goods to central scale installations.

National counting and weighing scales

The new scales are mounted on wheels and four-foot high legs. The scale is rolled over the boxes, barrels, drums or other items to be weighed and standard "grabs" are fastened on. A hydraulic-lift swings the load clear of the floor, and direct weight or count readings are taken from the indicating head in the standard way.

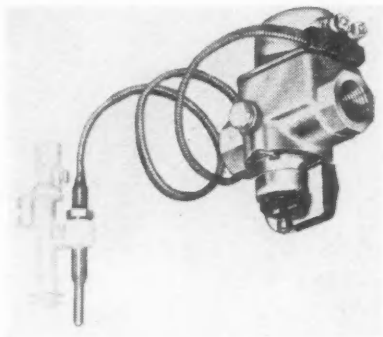
Models now in production have a weighing capacity of 1,000 lb or a counting ratio of 200 to 1. The counting scales accurately count pieces weighing one ounce or more.

P-43—Positive Shutoff Gas Cock

Having positive mainline shutoff during pilot lighting and reset operation, the new MR-2-5 gas cock of the General Controls Co., Glendale, Calif., is especially designed for floor, central, small space and water heaters, and is suitable for natural, manufactured, mixed, and liquefied petroleum gases.

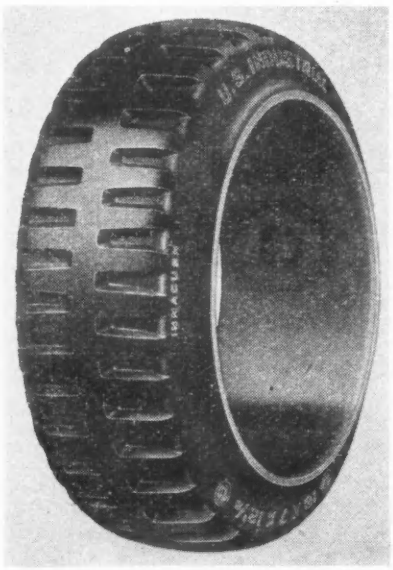
Flow of all gas automatically stops when the pilot is extinguished. During the reset operation, gas flows to the pilot burner only. No gas can pass to the main burner until the pilot is ignited and the safety valve set in the operating position.

The safety valve is protected by a complete seal against air-borne or gas-borne foreign matter or scum-forming vapors, and is double-sealed against gas leakage to the atmosphere.



Gas cock of the General Controls Co

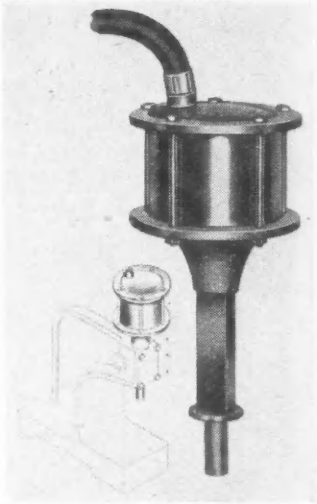
P-44—Soft-Solid Industrial Tire



This solid tire for powered industrial trucks designed to lessen driver fatigue and reduce vehicle maintenance cost, is now in mass production by United States Rubber Co., New York, N. Y. Known as the U.S. Innacush, the tire has a soft inner construction to provide greater cushioning effect. Design is said to combine the high load capacity and trouble-free performance of solids with the vibration absorbing characteristics of pneumatics.

P-45—New Air Conversion Unit

Paragon Metal Products, Chicago, Ill., has recently placed on the market a new air conversion unit for converting any of the popular size hand-operated arbor presses into air presses.



Paragon air conversion unit

The unit is complete, ready to use and is said to be installed in a matter of minutes. An old press converts into an air press when the ram retainer plate and ram are removed, the air unit set into the ram seat, the plate replaced, and the unit is connected to the shop air line. Models fit presses of various size and shaped rams.

Utilizing the Paragon air conversion unit obviates discarding or retooling the fixtures and tools which were made to fit on the bed of a present hand-operated press.

This air conversion unit has a 4 in. I.D. cylinder, a 2½ in. stroke, a ¾ in. ram, and a power factor twelve and a half times that of the line pressure.

P-46—Spatter-Resisting Welders' Clamps

A solid alloy screw that permanently resists spatter is provided on the new Hargrave No. 41 light service welders' clamps, brought out by the Cincinnati Tool Co., Cincinnati, Ohio. This anti-spatter screw it is said, sharply reduces early replacements of clamps necessitated by spatter formation. In addition, a new forged steel, heat-treated frame is provided. The No. 41 clamp is manufactured in 2, 4, 6 and 8 in. openings. The anti-spatter screw and forged steel frame are also available on the Hargrave No. 43 heavy service welders' clamp.

Essential

. . . for Leak-Proof, Pressure-Tight Automobile Assemblies!

All three Permatex Form-A-Gasket Sealing Compounds make every type of assembly leak-proof and pressure-tight . . . be it threaded, flat or flanged. They all prevent corrosion and are leak-proof to gasoline, fuel oils, lubricating oils, hot or cold water, all types of anti-freeze and numerous other liquids and gases. Use the one that best fits the job.

Permatex Form-A-Gasket No. 1 (a paste) dries fast and sets hard, but never becomes brittle. Makes tough, permanent unions even with warped or pitted surfaces.

Permatex Form-A-Gasket No. 2 (a paste) sets slower than No. 1. Dries to a tough, pliable film with plenty of "cushion" to absorb continual vibrations . . . yet disassembles easily.

Permatex Aviation Form-A-Gasket No. 3 (a brushable liquid) quickly dries to a tacky paste. Since it acts as a lubricant before it seals, threaded connections can be tightened up all the way without binding. Unions are easily disassembled. Will not run at 400° above nor become brittle at 70° below.

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NEW Products for AIRCRAFT

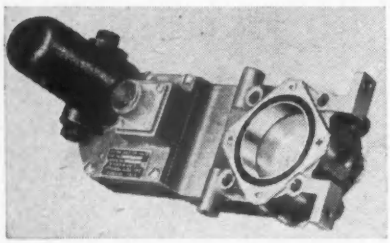
For additional information regarding any of these items, please use coupon on page 56

U-1—Motor Operated Gate Valve

A new type of motor operated gate valve approved for Army and Navy aircraft, was recently introduced by Hydro-Aire, Inc., Burbank, Calif.

To facilitate servicing, the seals of this new gate valve remove without disassembling the entire valve. The electrical portion of the valve is supplied as a self-contained package consisting of a motor, limit switches, receptacle and wiring, mounted on a cover plate. It can be replaced by removing five screws without disconnecting the valve from the bracket or attaching lines. No additional adjustment is necessary after placing the electrical package in position on the valve. The split field series wound motor incorporates long, accessible brushes, ball bearing construction, and hardened and ground worm. It operates at normal voltage of from 18 to 30 volts and meets the requirements of Specification AN-M-10A.

The gate valve is said to be unaffected by dust, humidity or water; is explosion proof; meets requirements of ambient temperature ranges up to 550 F.; is adaptable to extremely high pressures for fuel and engine oil systems and also suitable for hot air applications.

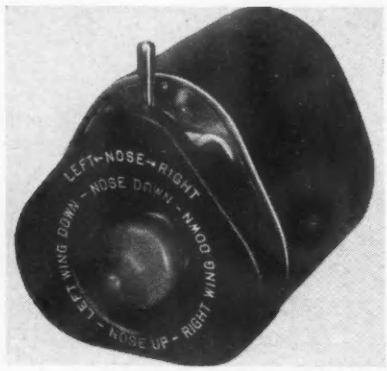


Hydro-Aire motor operated gate valve

U-2—Trim-tab Control Unit

Centralized, finger-tip control for the entire trim-tab system of an airplane is afforded by the style TC-58-E master switch announced by General Control Co., Boston, Mass. In this control unit, two conveniently placed levers actuate six different switches governing the forward and reverse fields of three electrical thrust motors which operate aileron, elevator, and rudder trim tabs. A four-position toggle lever actuates snap-action switches to control the two motors which provide trim for Nose Up, Nose Down, Left Wing Down, and Right Wing Down. It is impossible to operate both the elevator and the aileron tab motors at the same time. A two-position lever at the top of the unit energizes the rudder trim tab motor for Nose Left and Nose Right trim.

All switch elements are the snap-action type, affording quick make and break for positive d-c switching no matter how slowly the control lever is moved. Wiring and action are such that it is impossible to energize both forward and reverse fields simultaneously for any motor. The snap-action switches are capable of handling a ten-amp non-inductive load at 24 volts d-c.



General Control Company's master switch for airplane trim-tab system

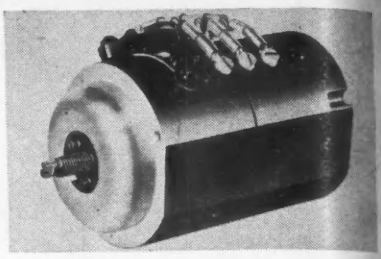
U-3—Synchronous Differential

Used in synchronizing of engines, the new synchronous differential developed by the Square D Company's Kollsman Instrument Div., of Square D Co., Elmhurst, N. Y., serves as an intermediary regulating device of engine control equipment. It may also be used as a torque producing half-speed synchroscope.

The unit consists of two synchronous motors and a mechanical differential. Each of the two synchronous motors reflects the operating speed of an engine. These two motors in turn activate a ¼ in. threaded output shaft which rotates at a rate equal to one-half the difference of the speeds of the two motors. However, when the speeds of the two motors are equalized, the output shaft of the unit becomes stationary.

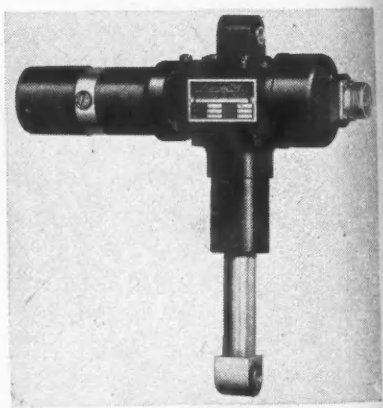
Unusual efficiency and smooth operation are claimed for the differential through use of hysteresis motors. Motors do not require external excitation, but are said to yield great running torque.

Synchronous differentials presently being produced operate from a three-phase source over a frequency range of 15 to 60 cycles per second, with an input voltage of 0.007 times the frequency in cycles per minute. Also available are similar units wound for high voltages and two- or single-phase operation.



Synchronous differential of Square D Co.'s Kollsman Instrument Div.

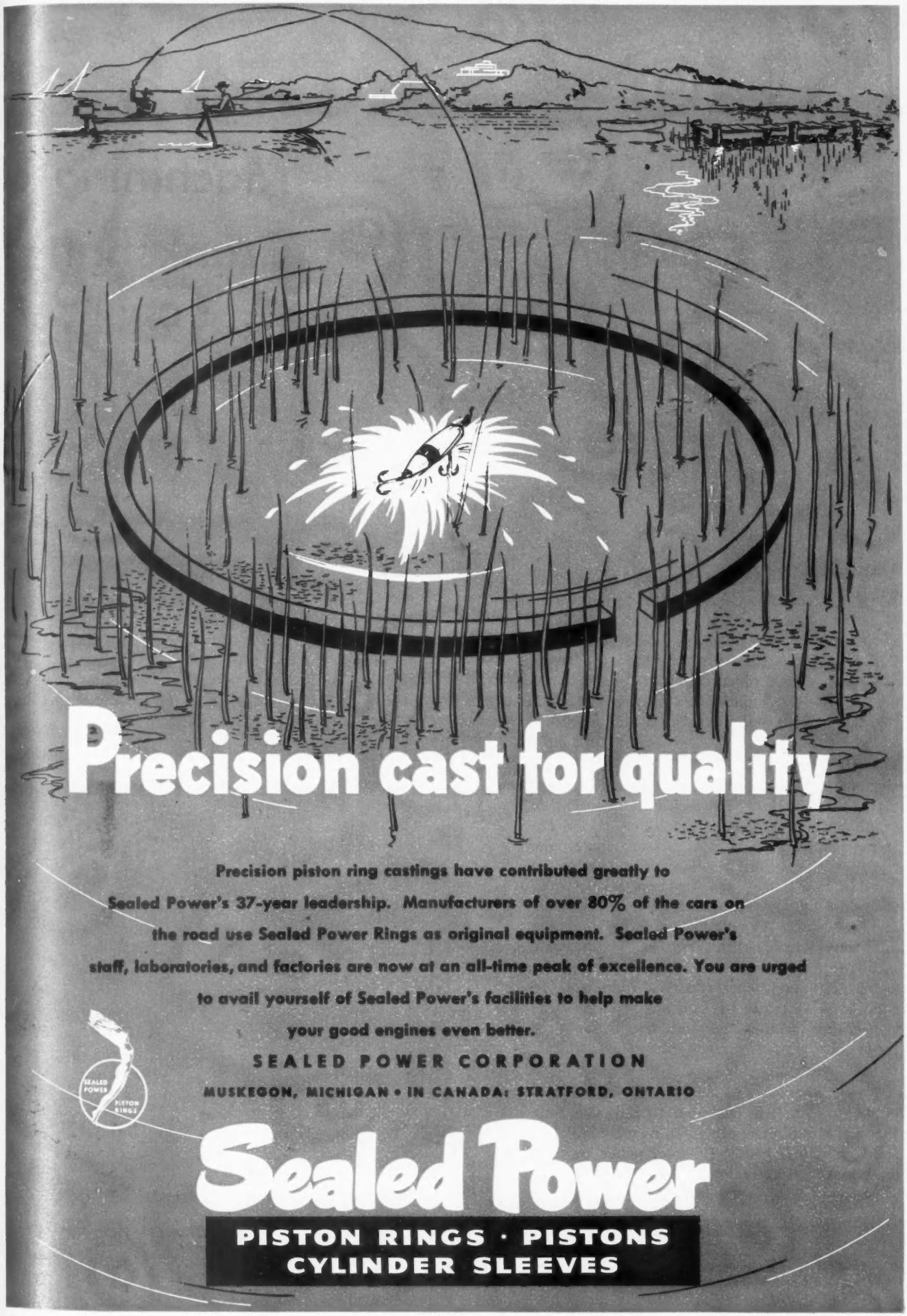
U-4—New Linear Actuator



Airborne linear actuator

Originally designed for flight control systems in Navy fighters, a linear actuator is now offered by Airborne Accessories Corp., Hillside, N. J., as a standardized unit for currently applicable service specifications.

The maximum operating load rating is 1500 lb for intermittent duty of one minute on ten minutes off. Static capacity of the ball bearing jack is in excess of 5000 lb tension. Static compression rating is dependent on length of jack assembly employed. The Lineator has been designed to meet the applicable requirements of specifications AN-M-10a, AAF 41251, and TN-TSESE-1.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High Speed Machining of Crankshafts at Cadillac

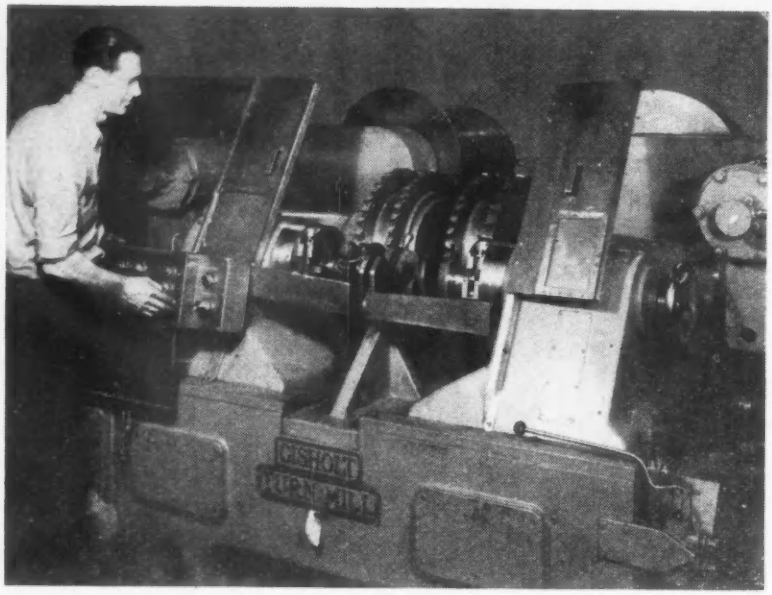

Fig. 1—Close-up of double-head Gisholt Turn Mill for main bearing journals.

ONE of the first of the mass production applications of the Gisholt Turn Mill for crankshafts is being placed in service at Cadillac Motor Car Division of General Motors. The crankshaft for the Cadillac V-8 engine has five main bearing journals and four crank pins, the latter being arranged 90 deg apart. To handle this crankshaft, Cadillac has two Turn Mills—one for the main bearing journals, the other for the pins.

Fig. 1 is a close-up of the work station of the double-head Turn Mill for the main bearing line. Preceding this operation crankshaft forgings are machined at the extreme ends and centered. At the same time the center journal is machined so as to provide the center bearing rest support for Turn-Milling the remaining four main bearing journals. As illustrated, the machine has four large milling cutters which come into action simultaneously. It may be noted that each cutter serves a number of functions—it turns the journal to size, turns the corner radius, and at the same time faces the thrust surface and the counterweight cheek.

The enormous and more complicated machine in Fig. 2 is designed to mill the four throws simultaneously. This machine has four individual heads, three of which may be seen in the illustration, the fourth (not visible here) feeds from the bottom up. Each of the four heads incorporates an arrangement of cam-controlled slide action to turn the cylindrical surface of the pin during the course of a single revolution of the crankshaft on its main line centers. At the beginning of a cycle, all of the heads feed into place, cutting on the sides until the four cutters are in position for turning the diameter. At the proper instant the work is rotated and in one complete revolution the cutters effect the accurate turning of the pin, the shoulder radius, thrust faces and counterweight faces.

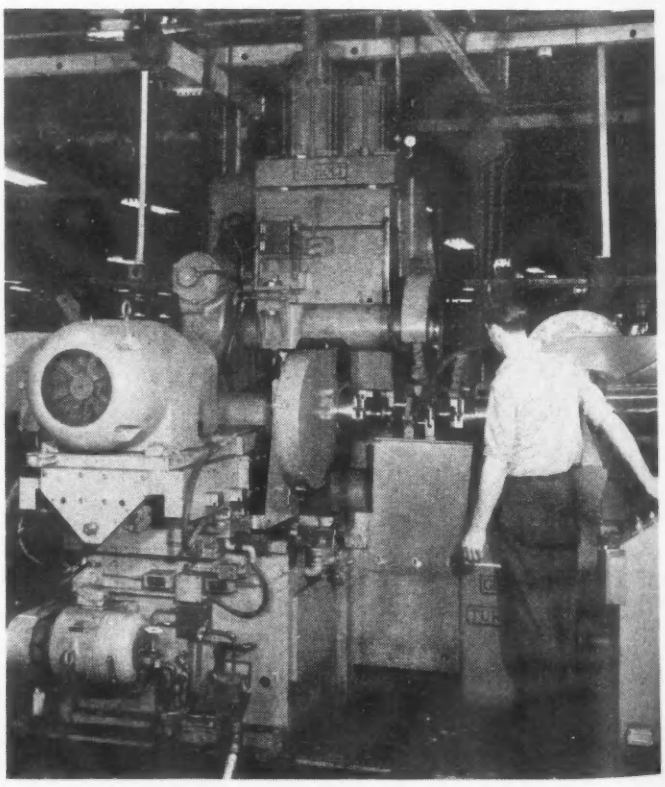

Fig. 2—This is the big four-head Turn Mill installed at Cadillac for simultaneous turning of crankpins.

2,000,000 drivers use this jet constantly

— it's a safety aid for ALL cars, ALL seasons

Most drivers use their "Two Little Squirts" countless times during the year — for it takes only the touch of a button to wash off roadsplash, dirty mist, eye-dazzling dust.

Today more than *two million* are in use. Five leading car manufacturers answer the constantly increasing demand by installing Trico Automatic Windshield Washers at the factory. And fourteen makes have built-in provision for quick installation by car dealers or service shops.

Factory installed by Buick, Cadillac, Oldsmobile, Pontiac and Lincoln Cosmopolitan

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Trico Products Corporation, Buffalo 3, N. Y.

Windshield Washers

Fully automatic • Nothing to pump

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L-43—Laboratory Presses

The Hydraulic Press Mfg. Co.—H-P-M Smooth Line Laboratory Press is the title of Bulletin 4801 which describes in detail the company's new 20-ton capacity, self-contained laboratory press. The new press is used for various operations, including briquetting, tensile testing, extracting, molding, laminating, compression testing, etc. The booklet contains information on how the press works, with diagrams showing the use of various fixtures and attachments furnished by the company.

L-44—Synthetic Elastic Compositions

E. I. duPont deNemours & Co., Inc., Fabrics Div.—Properties and uses of Fairprene synthetic elastic compositions are described in a 12-page manual released by the company. It reviews the physical and chemical characterists of each of the three groups of Fairprene products, sheet stocks without fabric back or cloth insert, coated fabrics and cements made with synthetic elastomers. Typical applications are illustrated by photographs. Charts, graphs and tables present technical data. A guide to the selection of the proper type of Fairprene fabric for each special use is a feature of the booklet.

L-45—Flexible Couplings

Ajax Flexible Coupling Co., Inc.—A new 24-page catalog, No. 48, contains working data on the complete line of the company's flexible couplings. It covers many types of Ajax Flexible Couplings including standard types S and A as well as Shear Pin, Brake Drum, Bolt-On and Detachable Hub Couplings. Data is given on forged steel and cast semi-steel construction. Capacity and dimension data covers the wide range of Ajax sizes.

L-46—Engine Valve Failures

Eaton Manufacturing Co.—The July, 1948 issue of the Eaton Forum is devoted almost exclusively to an interesting, illustrated article on engine valve failures. The photographs used in the article were chosen to represent typical failures in each category. A study reference chart of failures, causes and corrections is part of the article.

L-47—Twin Wasp E Engine

Pratt & Whitney Aircraft Div., United Aircraft Corp.—A new brochure describes the New R-2180 Twin Wasp E Engine. The booklet is attractively illustrated and is divided into sections covering the following: Nose, Power, Blower, Carburetion, Accessory Drives, Ingnition System, Engine Mounting, and the final section comprises four external views of the engine.

L-48—Phenolic Molding Compounds

Durez Plastics & Chemicals, Inc.,—A new 16-page booklet Durez Phenolic Molding Compounds gives interesting facts and data regarding the manufacture, use, methods of molding and selection of Durez materials. A concise chart outlines the physical and chemical properties of a representative group of materials and suggests applications for which they are particularly well-suited. Design suggestions for molded phenolic parts and information in finishing procedure are other subjects covered.

L-49—Microcasting

Austenal Laboratories, Inc., Microcast Div.—A new 16-page booklet en-

(*Turn to page 78, please*)

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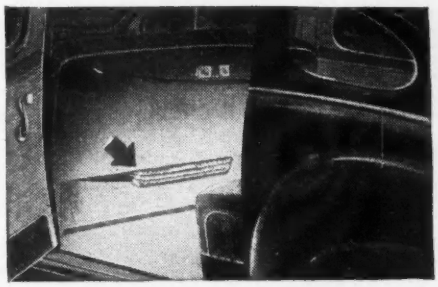
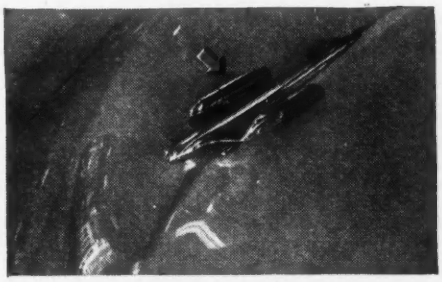
FOR MICRO*STYLING THAT SELLS -

You can't beat "LUCITE," the time-tested plastic



FLOOR-LIGHT LENS OF "LUCITE." It's a MICRO-STYLING possibility that could make a fine impression . . . especially when it's designed for beauty *and* long-lasting service with "Lucite."



A SMART-LOOKING HOOD ORNAMENT of weather-resistant "Lucite." One of 99 parts molded of "Lucite" now used on 17 makes of automobiles. Keeps its sparkling color and handsome design through years of hard outdoor service.

Molded by *Hoosier-Cardinal Corporation, Evansville, Ind.* and *Michigan Molded Plastics, Inc., Dexter, Mich.*

* WHAT IS MICRO-STYLING?

MICRO-STYLING is the design of small but important automobile accessories for beauty and utility too. A sparkling tail-light lens . . . a handsome horn button . . . an ash-receiver handle that looks and feels luxurious . . . a host of little things aimed to impress the customer. MICRO-STYLING can help sell and *re-sell* your cars . . . to buyers who are becoming more and more style-conscious. But remember—it calls for *the best* in quality materials . . . and that means Du Pont "Lucite"!

HERE ARE some of the advantages that make "Lucite" your wisest investment for MICRO-STYLING:

LONG-LASTING COLOR—"Lucite" comes in a wide range of color-fast hues, transparent, translucent, and opaque. They hold their beauty through years of weathering and hard service. They have since 1937.

SPARKLING TRANSPARENCY—Smartly designed dial faces, lenses, etc., of crystal-clear "Lucite" transmit up to 92% of light. "Lucite" can "edge-light" and "pipe" light around curves.

LUXURIOUS SMOOTHNESS—You'll notice right away the soft, smooth look and feel of knobs and handles made of "Lucite." And it withstands sharp knocks . . . it's not brittle.

OUTSTANDING DURABILITY—Pieces made of "Lucite" last for years and years . . . retain full beauty and utility even in exposed parts. In normal use, it is not damaged by gasoline, lubricants, or by many common solvents that cause crazing in less durable plastics. And "Lucite" is readily molded and machined.

FROM EVERY ANGLE, "Lucite" is *the* practical plastic for giving your car the MICRO-STYLING touch that means so much . . . that will help to sell your car again and again.

WRITE FOR FREE LITERATURE on "Lucite" and other Du Pont plastics. No obligation. If you wish, Du Pont technical men will be glad to consult with you in confidence and advise on applications of Du Pont plastics to help your MICRO-STYLING plans. Address E. I. du Pont de Nemours & Co. (Inc.), Plastics Dept., Room 208, Arlington, New Jersey.

Du Pont "CAVALCADE OF AMERICA" *returns to the air Monday, September 13—NBC network.*

DU PONT
REG. U. S. PAT. OFF.
Plastics
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

(*Continued from page* 48)

laboratory or production work is introduced by Studebaker Machine Co., Maywood, Ill. The new press is adaptable to broaching, assembling, piercing, oil grooving, riveting, sizing, forming, flanging, staking, forcing, small die tryouts. Special dies can be developed for any type of product requiring press work.

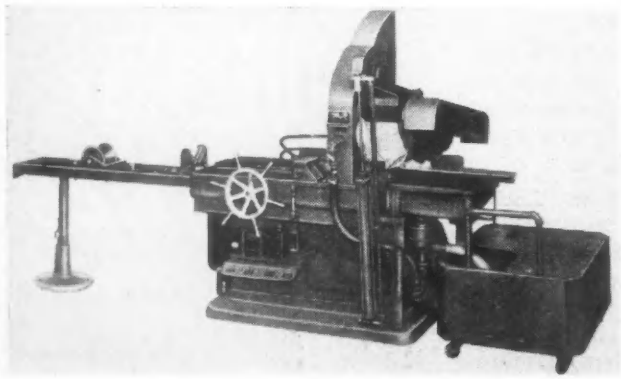
Optional with the unit are electrically heated platens for plastics or other operations that require temperatures. The heating element is thermostatically controlled for even distribution of heat over the entire platen. Operation of the hand lever produces up to 8 tons pressure between platens. The unit is self-contained, and self-powered. Control is entirely by hand lever; release by handy valve. Base is 10 in. by 10 in.; height 13 in.; hydraulic ram travels 3 in.; platens are 5½ in. by 7 in.; platen openings are to user's requirements—0.0 in. to 6 in.; weight is 70 lbs.

M-39—Abrasive Cutting Machine

Brought out by the Campbell Machine Div. of American Chain & Cable Co., Inc., Bridgeport, Conn., is a new Model 460 semi-automatic wet abrasive cutting machine. This Cutamatic consists of an oscillating swing frame, a work feeding and holding mechanism, a coolant system and a hydraulic work clamping and wheel feed unit.

The abrasive wheel is automatically fed through the work and upon completion of the cut, is automatically returned to the starting position. The return of the wheel is controlled to compensate for wheel wear. The handwheel operated feed carriage acts as a length gage bar for cut-off pieces and additionally serves as an ejector for the cut-off parts.

The bar being cut is firmly clamped on both sides of the cut-off wheel while the cut is being made. A hydraulic gripper in the feed carriage is timed with the clamps at the wheel so that the work bar is firmly held by one or the other at all times.



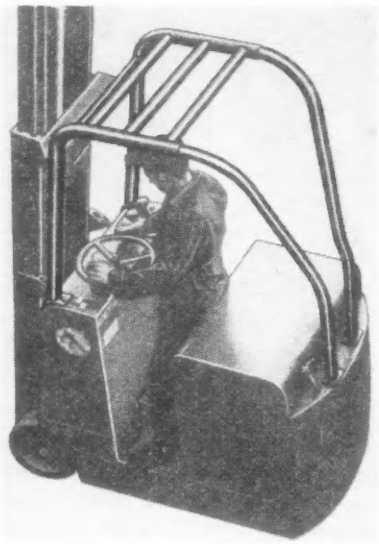
Model 460 Cutamatic wet abrasive cutting machine cuts materials of 6 in. dia solid stock or any shape that can be contained in a 6 in. circle.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

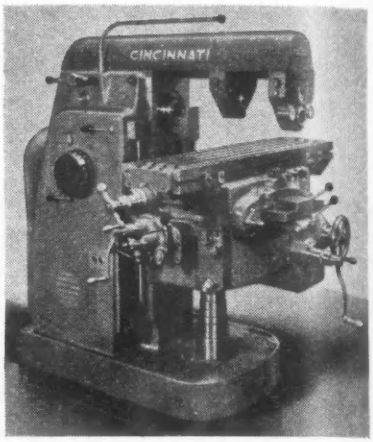
M-40—Canopy-Type Truck Guard

Latest addition to the line of attachments for power fork trucks manufactured by Lewis - Shepard Products, Inc., Watertown, Mass., is the new heavy duty canopy - type overhead guard illustrated. Constructed of heavy tubular arc-welded steel and supported at four points on the fork truck, the guard protects the operator from falling objects carried not only by the truck, but also stacked along route of travel. An expanded metal screen to fit over the horizontal portion of the guard is available. The guard is detachable and adaptable to fit every model of Lewis-Shepard gasoline or electric powered "Standrive" fork truck.



Lewis-Shepard overhead guard.

M-41—Dial Type Milling Machine



Cincinnati dial type milling machine

A new Dial Type milling machine announced by the Cincinnati Milling Machine Co., Cincinnati, Ohio, is built in medium and high speed ranges, plain, universal, and vertical styles, Nos. 2, 3, and 4 sizes for each of eighteen different machines.

High speed machines have 21 spindle speeds 20 to 1500 rpm for the No. 2 size and 18 to 1300 rpm for the Nos. 3 and 4 sizes, in approximate geometrical progression. Twenty-four feeds, also in geometrical progression, cover a range of 5/16 in. to 60 in. per minute. Medium speed machines have a slightly smaller selection of speeds and feeds, and the upper limits are 1/3 those for high speed machines.

Vertical machines are equipped with power feed and rapid traverse to the vertical head, and a four position, dial indicated turret stop. The vertical head has 16 and 24 different feeds, for the medium speed and high speed Dial Types, respectively. Feeds range from 5/16 in. to 8 in. per minute, and ⅛ in. to 24 in. per minute. The rapid traverse rate is 40 in. per minute for both.

An electrical contact button automatically stops the motor. Rotating shafts are enclosed. High voltages are reduced to 110 at the push button station.

The motor is mounted on adjustable rails in the column. Power is transmitted to the main drive pulley through V-belts and then to the spindle and feed drive through a large multiple disc clutch.

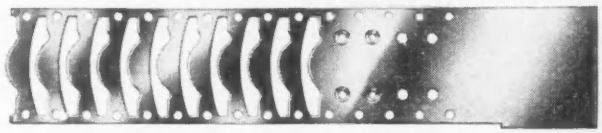
130 parts per minute from .062 stock

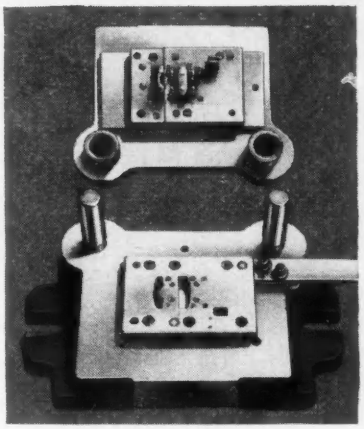
tolerance held within .002"

. . . using

DANLY PRECISION DIE SET

Six-stage progressive die produces 65,000 steel stampings per grind





In the stamping operation shown here, .062 cold rolled steel parts for electric shavers are pierced, swedged, sized, and blanked in an intricate six-stage progressive die. A Danly Precision Die Set, consisting of a semi-steel punch holder and all-steel die shoe, is used to take full advantage of the die maker's precision.

The six-stage die produces these parts at a rate of 130 per minute. Over-all tolerances are held within .002", and *an average of* 65,000 *parts are obtained between grinds.*

As a result of the close operating precision that is maintained, tumbling is the only secondary operation that is required to finish the piece.

Built to precision tolerances (guide posts and bushings ground to limits of two ten-thousandths of an inch) the operating accuracy of Danly *Precision* Die Sets insures close tolerances and long tool life.

Danly has a wide range of standard stock sizes available that can be quickly assembled and delivered to help you save time and money.

Danly engineering service—For helpful information on die sets of any size, standard or special, for any type of press operation, consult our engineering department. No obligation.

sequence of operation

Following is the sequence of operations performed as the C. R. Steel Strip is fed through the six-stage progressive die:

1st Step: Notch edge for feed stop.
2nd Step: Pierce pilot holes.
3rd Step: Pilot in outer holes. Pierce two holes.
4th Step: Swedge two holes.
5th Step: Pierce holes to size.
6th Step: Blank.

DANLY NATION-WIDE ★ ASSEMBLY SERVICE

Danly offices in 10 key cities give immediate attention to your orders. Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

★ **Chicago 50,** 2100 S. 52nd Ave.
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★ **Dayton 2,** 990 E. Monument Ave.
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★ **Los Angeles 54,** Ducommun Metals & Supply Co., 4890 S. Alameda
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Illustrates how Danly's Special Machining and Welding Service can save you time and money for unusual die set applications.

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PRECISION DIE SETS...STANDARD AND SPECIAL | MECHANICAL PRESSES AND PRESS EQUIPMENT

Personals

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

General Motors Corp.—**Roger M. Kyes** has joined the staff of the Corporation to work on special assignments, reporting directly to Mr. C. E. Wilson, President.

General Motors Corp., Delco Appliance Div.—**Edward A. Halbleib** has announced his retirement as General Manager and is succeeded by **Paul H. Rutherford.**

Ford Motor Co.—**Earl C. Ward** has been named General Manager of the newly created Parts and Accessories Div.

Willys-Overland Motors—Recent appointments in the Procurement Div. are as follows: **M. P. Williams** is Purchasing Agent for stampings and their dies, etc. **G. R. Cheetham** is Purchasing Agent for Mechanical and Electrical Units and Assemblies. **J. S. Conant** is Purchasing Agent for raw materials.

Chrysler Corp., Chrysler Div.— **A. M. FIeming** has been appointed Vice-President in charge of Manufacturing. **Fred A. Wunderlich** has been appointed General Works Manager of the Division, succeeding Mr. Fleming.

Chrysler Corp., Export Div.—**F. G. Shagney** as Asst. Truck Sales Mgr. has been announced.

Chrysler Corp., Dodge Div.— **O. W. Franke** has been promoted to Operating Manager.

Boeing Airplane Co.—**Edward C. Wells,** elected Vice-President—Engineering; **Lysle Wood,** appointed Chief Engineer and **N. D. Showalter,** Asst. Chief Engineer.

Douglas Aircraft Co., Inc.—**Harry Woodhead** has been made General Manager of the new Metal Products Div.

The Timken Roller Bearing Co.—**Whitley B. Moore** was elected Vice-President in charge of Sales, succeeding **L. M. Klinedinst,** retired.

United Aircraft Corp., Hamilton Standard Propellers Div.—**Glenn L. Lampton** has become Consulting Engineer. **Ermano Garaventa,** Chief Blade Engineer. **Sigmund A. Czarnecki,** Master Mechanic and **Charles B. Conwell,** Process Engineer.

Ethyl Corp., Research Laboratories —**Benjamin Brewster** has been appointed to the newly created position of Manager of the Technical Service Div.

International Nickel Co. of Canada, Ltd.—**Paul Queneau** has been made Metallurgical engineer.

Dena Corp., Spicer Mfg. Div.—**Loren J. O'Brien** has been appointed Chief Engineer of the Axle Div.

Tinnerman Products, Inc.—**Robert D. Williams** has been appointed Personnel Manager.

The Warner & Swasey Co.—**Myron S. Curtis** has been made Director of Engineering.

Ex-Cell-O Corp.—**T. M. Olson** has resigned the position of Vice-President in Charge of Sales.

ACF-Brill Motors Co.—The appointment of **Arthur R. Danjus** as Manager of Parts Distribution has been announced. Mr. Danjus succeeds **C. C. Rinker,** resigned.

Philco Corp.—**James M. Skinner, Jr.** has been made Vice-President of Service and Parts Div.

General Electric Co.—**R. I. Parker**

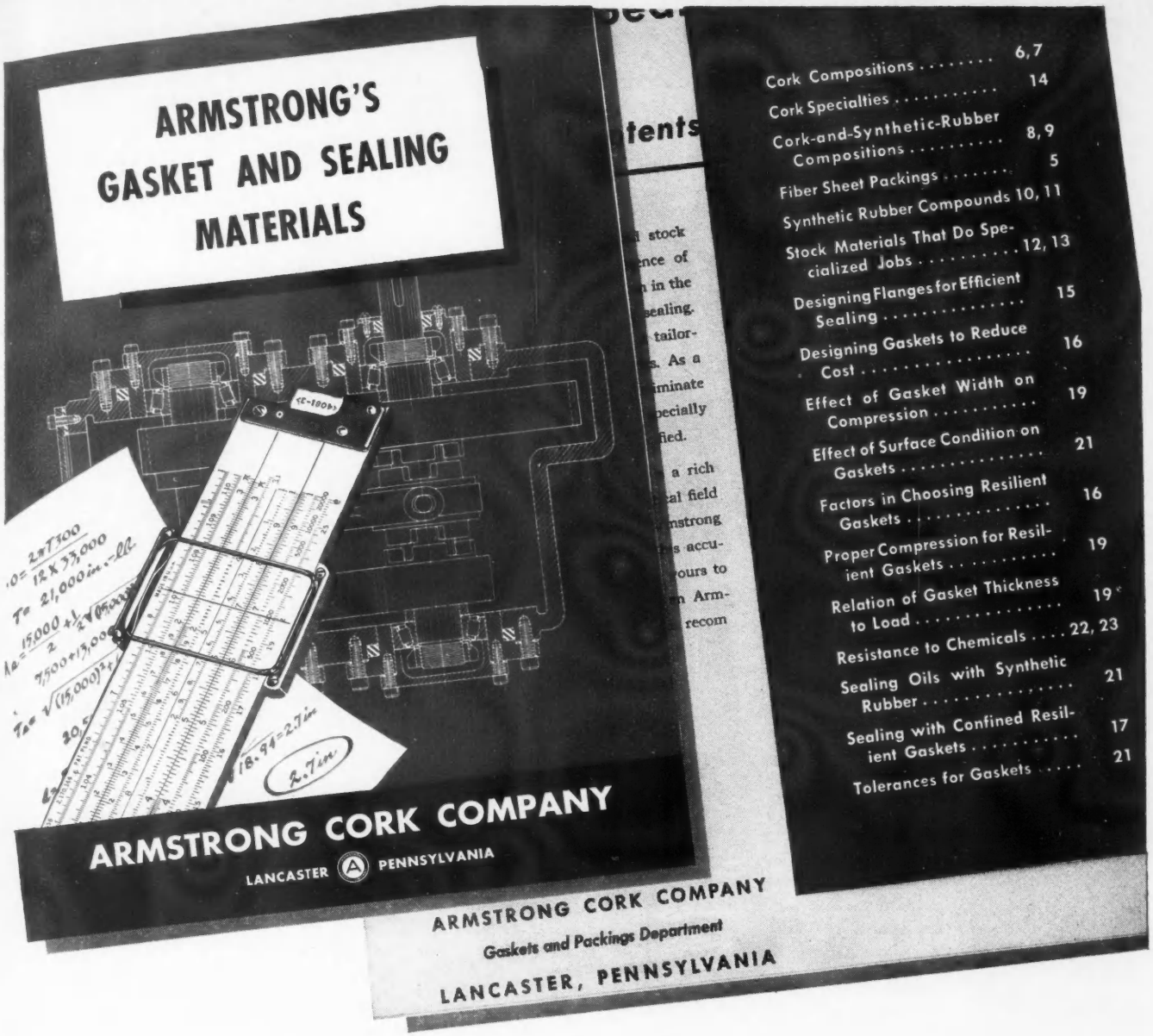
(*Turn to page* 62, *please*)

You can depend on-

BORG & BECK

FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD!

BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO 38, ILLINOIS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Cork Specialties 14
Cork-and-Synthetic-Rubber Compositions 8, 9
Fiber Sheet Packings 5
Synthetic Rubber Compounds 10, 11
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Sealing with Confined Resilient Gaskets 17
Tolerances for Gaskets 21
ARMSTRONG CORK COMPANY
Gaskets and Packings Department
LANCASTER, PENNSYLVANIA

New edition contains valuable gasket data

Do you design or buy gaskets and seals made of synthetic rubber, cork-and-synthetic rubber, cork composition, or fiber sheet materials? Then you will find the new, enlarged, 24-page edition of "Armstrong's Gaskets and Sealing Materials" a valuable source of information.

"Armstrong's Gasket and Sealing Materials" contains all the technical data that made the first edition so useful. In addition, this booklet shows how Armstrong's stock materials may be put to specialized uses in the radio, electrical, automotive, petroleum, and transportation industries. The new edition also includes latest government specifications and up-to-date materials charts. Much of the technical data and application information this booklet offers is available nowhere else.

For your free copy, clip and fill in the coupon given below and mail to us today.

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Please send me at once a copy of the new 24-page booklet, "Armstrong's Gasket and Sealing Materials."

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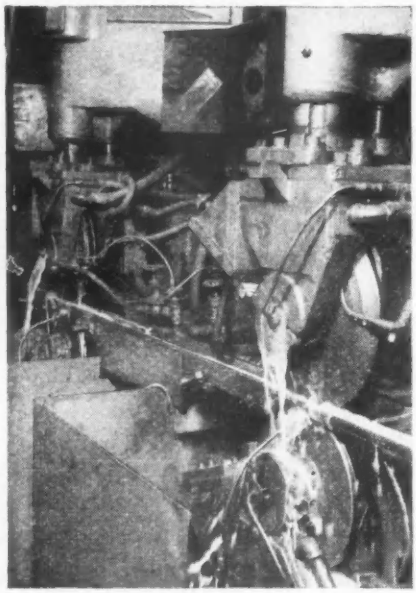
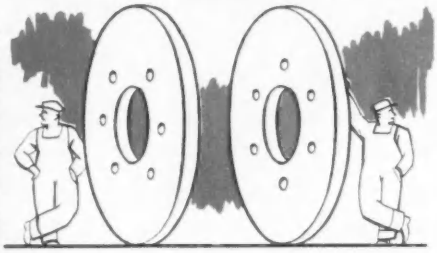




BUT THEY WORK TOGETHER

As brothers, to produce a perfect, enduring seam weld!

WEIGER-WEED TRADE MARK

SEAM WELDING WHEELS

Ask for your copy of the Weiger-Weed manual to become familiar with Weiger-Weed products and service, to help you turn out stronger, lighter, more easily fabricated products at lower cost.

Weiger-Weed Wheels are of uniformly high quality, carefully forged and finished to give (1) strong, clean welds; (2) long life on high production runs; and (3) minimum down time for dressing the welding surfaces. Whatever materials you are welding– carbon steel, stainless steel, tin plate, terne plate and other coated steels, zinc, nickel alloys, weldable bronzes or aluminum—Weiger-Weed has specific alloys, thoroughly proved for quality and fitness, from which wheels can be fabricated. To speed delivery, several sizes of blanks are carried in stock.

Weiger-Weed Wheels are supplied finished to your specifications ready for installation, or in rough form for you to finish to your requirements. Write today for help on your specific seam welding problems.

Weiger-Weed Standard Replaceable Welding Tips

For more and better spot welds at top production speeds, with fewer dressings, use the right Weiger-Weed Tip for your metal and conditions. You can get most sizes and shapes promptly from stock—as well as standard holders that are absolutely leak-proof!

Weiger-Weed produces electrodes and dies for all resistance welding requirements—spot, seam, flash, butt, projection. At your service is top-notch engineering and production skill. Ask the Weiger-Weed engineer for help. Weiger-Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Avenue, Detroit 4, Michigan.

WEIGER-WEED TRADE MARK

Resistance Welding ELECTRODES

DIES • TIPS • WHEELS • HOLDERS

DIVISION OF FANSTEEL METALLURGICAL CORPORATION

(*Continued from page* 60)

has been elected a Commerical Vice-President suceeding **W. O. Batchelder,** retired. **Leland W. Mosher** was elected an Asst. Secretary by the Board of Directors.

Eaton Mfg. Co.—The appointment of **D. F. Brawn** as Sales Mgr. of the Stamping Div., has been announced.

Pittsburgh Plate Glass Co., Ditzler Color Div.—**Rolland I. Peters** has been appointed Technical Director.

Purolator Products, Inc.—**James Corona** appointed Personnel Mgr.; **John Rawlins,** Factory Office Mgr.; **Robert Krueger,** Safety Engineer and **Kenneth E. Dietz,** Purchasing Agent.

Ansul Chemical Co.—**Franklin Wedge** has been appointed Asst. to the President.

Henry Ferguson, Inc.—**W. L. Vande Water** appointed Domestic Sales Manager.

Kearney & Trecker Corp., Walker-Turner Div.—**Kenneth F. Whitfield** has been made Sales Promotion Manager.

Dearborn Motors Corp.—**B. A. Best** has been elected a member of the Board of Directors.

Aluminum Research Laboratories—**William T. Ennor** has been named an Asst. Director of Research. **Norman Olsen,** Sales Manager of Aluminum Seal co., Inc., has been made Vice-President in Charge of Sales of that company.

Pioneer Engineering and Manufacturing Co.—**Frederick M. Bock** appointed as Asst. to the President, **Mr. A. M. Sargent.**

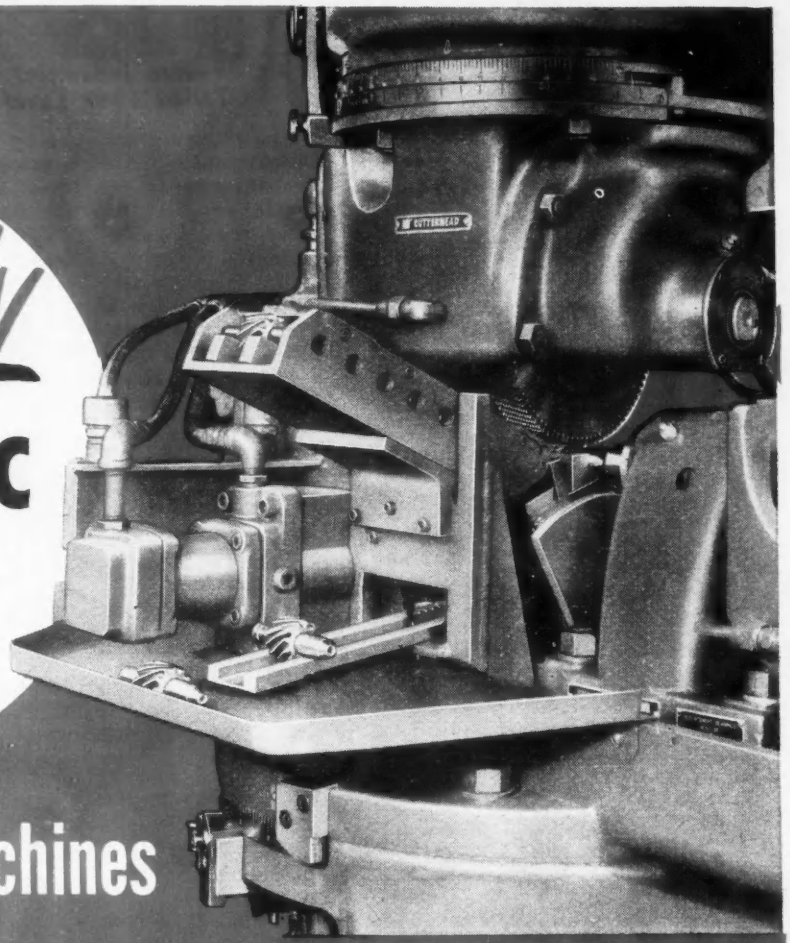
United States Rubber Co.—The appointment of **Harold A. Shank** as Manager of the Aircraft Tire Department has been announced.

Sperry Gyroscope Co., Foundry Div.—**Joseph Chini** has been appointed Supt.

Washington Steel Corp.—**John C. Richards** appointed General Manager of Sales; **Robert O. Fulton,** Assistant Sales Manager.

Adel Precision Products Corp.—**Fred T. Miller** appointed to the position of Sales Manager.

Howard G. Pankratz has joined the Sales-Engineering-Consultant staff of the Industrial Div. of The R. C. Mahon Co.



First Fully AUTOMATIC LOADER For Gear Shaving Machines

● The Red Ring Automatic Loader, the first practical unit of its kind to be developed, has greatly increased the economy of the gear shaving operation. Equipped with such loaders, a battery of shaving machines can be kept in continuous operation by one man whose only duty is to keep their magazines loaded with work gears. That requires no skill.

Loading, clamping, shaving, unclamping, unloading and the final discharge of the finished gear are all automatic and fully protected by a safety mechanism. This is another significant accomplishment by the Red Ring organization which is today the world's largest manufacturer of gear shaving equipment.

The gear shown in the illustration here is an overdrive transmission planet pinion having 12 teeth, 13.5 D.P., 20° P.A., 1″ P.D. and a 1″ face. Actual shaving time is 11 seconds, loading and unloading 2.3 seconds or a total of 13.3 seconds for the complete cycle. This gives a production of 270 parts per hour. Stock removal is .005″ over pins.

The Automatic Loader is applicable to Red Ring Shaving Machines GCV and GCU for automotive transmission gears or similar units. For further details and quotation, call a Red Ring Engineer.

"World's Largest Producer of Gear Shaving Equipment"

NATIONAL BROACH AND MACHINE CO.
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Engineering Library

General News

(*Continued from page 23*)

be counted as an overtime payment when he puts in more than 40 hours a week. He must be paid for hours beyond 40 a week at a rate which is one and a half times the regular rate of pay, including the extra pay he got for his regular week-end or night work.

"However, if the extra payment for Saturday, Sunday, holiday or night work is made because the employe has previously worked a certain number of hours or days, the premium payments will be regarded as true overtime pay, need not be included in the regular rate, and can be counted against the overtime required in the law. Moreover, this standard will apply even though a contract may also contain a provision calling for premium payments for work on those days or hours as such."

Automotive Industries Jobs Twice 1949 Level

According to estimates by the U.S. Department of Labor, employment in the automotive industries is today double what it was in 1939. The June report listed 925,000 persons employed in the manufacture of automotive vehicles and parts, compared with an average of 466,000 during 1939. June, however, was a low point thus far this year—64,000 under the peak attained last January. The decline during June was attributed to a shortage of steel which resulted in layoffs at several major plants.

GM First Half Net Tops $200 Million

A continuing high volume of replacement parts, GM Diesel locomotives, GM Diesel engines, Frigidaire products and other non-automotive products, were reported by General Motors Corp. in announcing net sales of $2,234,705,927 and net income of $206,763,672 for the first six months of 1948, and net sales of $1,145,554,234 and net income of $110,282,260 for the second quarter of 1948. This compares with net sales of $1,746,421,483, and net income of $137,559,202 for the first half of 1947, and sales of $941,568,274 and net income of $76,766,011 for the second quarter of 1947. GM's unit sales of cars and trucks to dealers in the U.S. and Canada and shipments overseas totaled 520,538 for the second quarter of 1948, compared with 473,805 for the same period last year. For the first six months of 1948, unit sales of cars and trucks amounted to 1,057,386, compared with 924,032 for the first half of 1947.

Ford Reported Experimenting With Overhead Valve Engine

Ford is reported to be undertaking a long-range experimental program to convert the present line of engines to valve-in-head design. The move indicates Ford's approach to high compression engines. The V-8 line is ideally suited for adaptation to high compression because of its shorter structure which gives greater rigidity to withstand the heavier stresses of high compression.

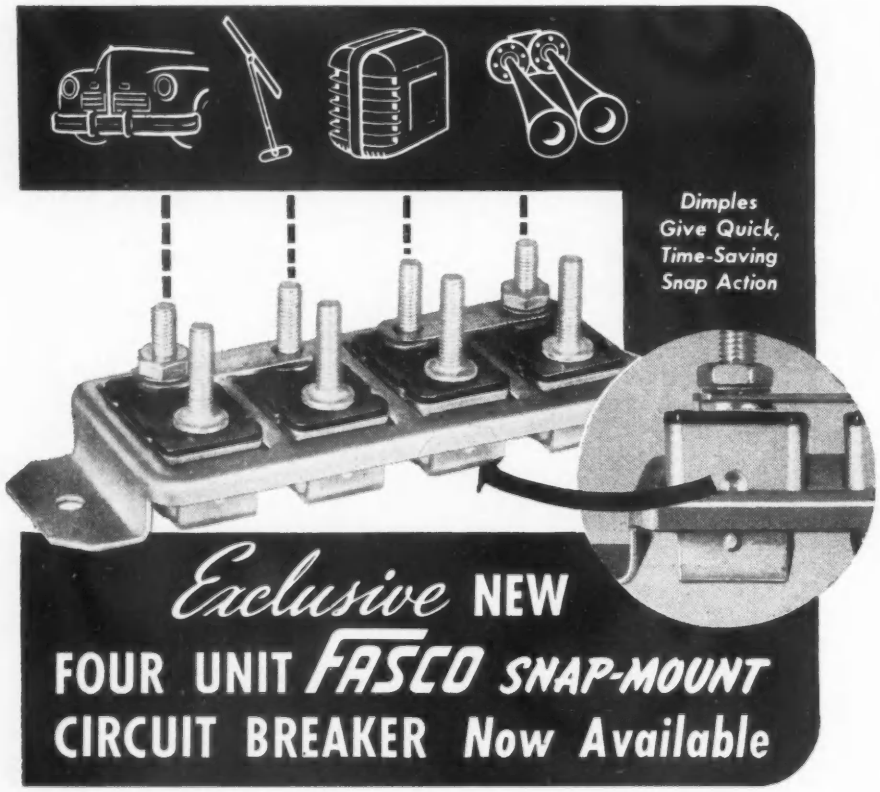
Hudson Sales Corp. Cuts Divisions from 6 to 4

The Hudson Sales Corp. has created four new domestic sales divisions to replace the six division system in use before Aug. 1. Under the new setup, the United States is divided into the eastern, north central, south central, and Pacific divisions.

USAF to Spend $367 Million for Engines

The aircraft industry is starting to feel the effects of the military defense program. The Air Force has announced it will place orders for several thousand engines costing $367 million during the current fiscal year which ends next June 30. The orders cover 5348 engines of various types, plus an indefinite number of a new type jet engine which is still considered experimental. Engines will be purchased from the Pratt & Whit-

(*Turn to page 96, please*)



Exclusive NEW
FOUR UNIT FASCO SNAP-MOUNT
CIRCUIT BREAKER Now Available

● Now automobile headlights, windshield wiper, horn, heater and other electric equipment can be wired to one circuit breaker assembly, saving valuable assembly time and money. It's the dimples in the mount and circuit breaker case (shown in the magnified view) that give the snap action and speed up production. Circuit breakers snap into the mount securely and quickly, *by finger pressure.* No spot welding. No screws. No tools needed. *And,* if desired the mount can be attached to the car body . . . the circuit breakers assembled on the wiring harness, and snapped into the mount when the car is wired. Engineered and made to last the life of the car. Write for further information, or phone our Detroit office, 6432 Cass Avenue, Detroit 2, Michigan. Phone Madison 6300.

FASCO
CIRCUIT BREAKERS

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Safeguard Operation of Automotive Electrical Equipment Instantly . . . Automatically . . . from Dangerous Overloads or Short Circuits.

F. A. SMITH MANUFACTURING CO., INC., ROCHESTER 2, N. Y.

Electrical Engineering and Manufacturing Serving the Automotive Field for 26 Years

New Federal Trucks

(*Continued from page* 40)

on the D65MA are of heavy duty air type, using a Bendix-Westinghouse 12-cu ft air compressor with two air reservoirs. Front brakes on this model are Timken-Westinghouse while rear brakes are Timken "P" Series type. The D65MA also features the Tru-Stop parking brake which is a 16 in. diam, four-shoe type having a lining area of 122 sq in.

The standard cab supplied on all models weighs 507 lb. In addition, Federal offers a sleeper cab weighing 960 lb.

Federal Six-Wheel Models

The complete new line of tandem axle six-wheel models has a GVW range of 27,500 to 55,000 lb. Because of the complication of specifications for the various models, the pertinent data concerning them are given in the accompanying tables covering engine and chassis specifications, gross vehicle weight ratings and maximum road speeds.

The cooling system on these models has a radiator core of fin-and-flat tube type, four in. in thickness, having a coolant capacity of 21 qt for the 629M and 629ML, 33 qt on the 635M, 29 qt on the 645M and 645MA. All models feature by-pass thermostat control of temperature.

In keeping with Federal practice all of the engines listed here are fitted with Tocco-hardened, counterweighted and balanced crankshafts. All engines also are equipped with a crankcase ventilating system.

The electrical system is Delco-Remy, with a 6-volt, 240-watt generator on the 629M and 629ML models, and a 320-watt generator on the other three models. The 645M and 645MA models on the other hand, offer a 12-volt system with a 320-watt generator at extra cost. With this option Federal provides two 19-plate, 6-volt heavy duty batteries. The wiring harness for all models features a group of three separate harnesses with a fuse for each circuit and three spare fuses.

Parking brakes of conventional drum type are used on the 629M and 629ML models. The remaining models all feature the Tru-Stop brake. On the 645M and 645MA models the front wheel brakes are controllable by a limiting valve.

The 635M model offers heavy duty Westinghouse air brakes as optional equipment, with a 7¼ cu ft Westinghouse compressor. Optional equipment on the 645M and 645MA models is the SW-3010-P Timken worm drive rear axle with ratios of 6.80 to 1 and 7.75 to 1.

Standard tire equipment is as follows: 629M and 629ML: 8.25-20; 635M: 9.00-20; 645M and 645MA: 10.00-20, 12-ply. The latter models also offer optional 10.00-22, 12-ply tires.

Alodized

Trade Mark

Aluminum and Aluminum Alloys

(Coated with "Alodine"®)

Provide A New Order of Durability in Metals

★ ★ ★ ★

SPECIFY

Alodized Aluminum or Alodizing

For the utmost in Metal Protection and Paint-Bonding

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

OBSERVATIONS

By JOSEPH GESCHELIN

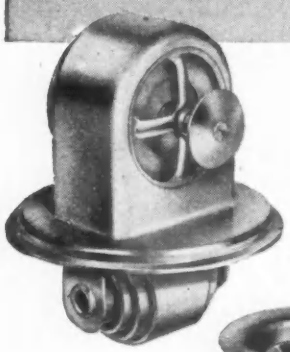
Sales Course

This summer Cornell University instituted a sales refresher course for machine tool sales engineers under the sponsorship of the National Machine Tool Builders' Association. Object of course is to acquaint sales engineers with the latest developments in manufacturing techniques, machinery replacement policies, and principally with an appreciation of the type of analysis most useful to master mechanics' and machinery buyers.

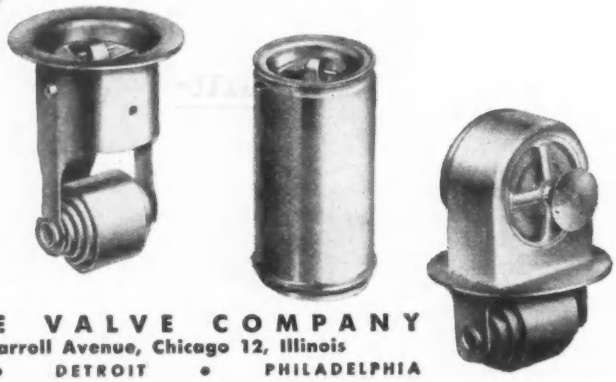
IMPORTANT:

in motor design, positive cooling system control is essential in achieving name-building performance

DOLE Thermostats
. . . in a range of types for every car



Stop-and-go control of cooling liquids—as provided by a Dole Thermostat—contributes to better motor operation and the improved performance on which a car's reputation is built. At all seasons, a Dole Thermostat assures quick warm-up—plus worthwhile savings in gas, oil and motor wear.



THE DOLE VALVE COMPANY
1901-1941 Carroll Avenue, Chicago 12, Illinois
LOS ANGELES • DETROIT • PHILADELPHIA

High Ratio

Despite the general consensus as to the outlook for fuels for high compression engines, we understand there will be at least two engines in 1949 designed basically for progressive increases in compression ratio. It is of more than passing interest to learn that these engines will operate efficiently on conventional premium fuels and will not require super fuels of uncommon octane rating.

Torque Converter

According to latest advice Buick has upped Dynaflow production to 400 units a day. That's nice business at $235 per copy. Judging by what we have noted lately there should be at least two other torque converter cars offered in 1949.

Submerged Arc

Many manufacturers are familiar with the advanced technique of submerged arc welding—its chief advantage being a deeply penetrant weld of great strength, leaving a clean practically flush joint which in many instances requires no further finishing. We understand that some recent experimentation has developed electronic control capable of enormously increased welding speed, coupled with an intermittant welding cycle.

Production Records

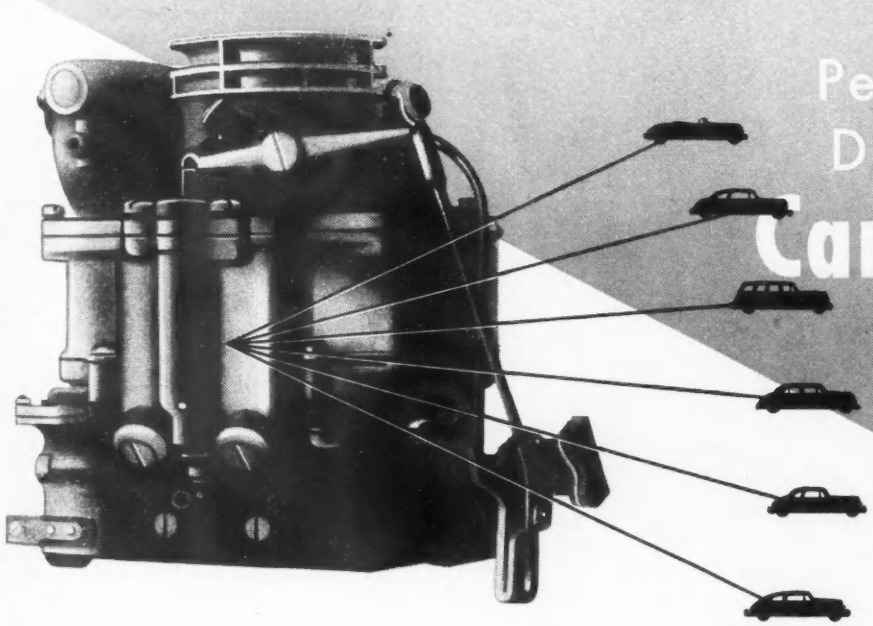
Completing the biggest year in its history, the Warner Gear Div., Borg-Warner Corp., delivered over three quarters of a million transmissions, and a million and a half synchronizers in 1947. In addition, the company produced over 125,000 overdrives. The last is particularly significant considering how little has been said in advertising regarding the merits of overdrive in the modern motor car.

Turns and Hardens

A prominent producer has had experience the past year with a really unique process. Small cup shaped parts are produced from bar stock in automatic screw machines, the machines being provided with built-in Budd induction heating heads. As the parts are completed they are hardened selectively on the interior surfaces. This combination of process holds much of interest to our readers.

(*Turn to page* 88, *please*)

Your Owners'
Satisfaction
Depends on
Performance



Performance
Depends on
Carburetion

You Can Depend on

STROMBERG

*REG. U. S. PAT. OFF.

for the finest carburetion

ECLIPSE-MACHINE DIVISION of Bendix AVIATION CORPORATION

Standard Equipment Sales: Elmira, N. Y. • Service Sales: South Bend, Ind.

Using Old Technique for Difficult Parts

(*Continued from page* 30)

Secondary metal is used exclusively. This is quite a departure in aluminum foundry practice considering the emphasis upon virgin metal. Secondary aluminum alloy ingots are supplied by an outside source and shipped to Bedford where all metal is duplexed to assure conformity to Allison specifications.

As mentioned earlier, this foundry is using the other well known techniques. The dry sand molding department makes castings for Allison jet engines, including unusually large and intricately cored sections. Castings are produced for other General Motors engine divisions, principally the Diesel engine divisions. For example, the large spirally formed blower rotors for Electro-Motive engines are made in permanent molds, using dry sand cores. A small, high-production permanent mold department is making aluminum timing gears with a bonded steel core.

One section of the Antioch department produces the smaller rotors for the Detroit Diesel Engine Division. Cores for these castings are made in rubber-like plastic molds which are so flexible as to make it possible to draw the cores without regard for inserts, undercuts or other obstructions usually offering insuperable obstacles.

When one considers the precision involved in making Antioch molds, it is easy to appreciate the need for engineering controls at every stage of the process and the necessity for constant research aiming at simplification. At the present time they have found it feasible to make some of the Dynaflow castings with molds having a plaster drag, plaster cores, and a dry sand cope. The latter feature marks the first step in reducing foundry cost. In time it is hoped that the scientific approach may even result in the ultimate development of improved slurries and simplified lower cost techniques with results comparable to the Antioch method in its present state.

When the Antioch process was first applied to the production of mechanical castings of high quality, it was soon found that the century-old methods would require considerable refinement of a fundamental nature. For one thing, the pure plaster mold was impermeable, and because it provided no outlet for gases the resulting castings were porous and lacking in physical properties. The program undertaken at Antioch College eventually produced the improvements responsible for the present status of the technique.

Another practical problem was how to make cores capable of maintaining the necessary dimensional tolerances, in castings, of the order of a few thousandths of an inch. To effect this, the cores themselves had to be made with even closer tolerances. The engineers tried the conventional methods of core making, including nicely machined steel molds, without success. But the program did lead to the evolution of unique plastic molds.

The major problems requiring solution before the Antioch process could be applied successfully to the making of sound and strong aluminum castings can be summed up briefly as follows:

1. The formulation of a plaster mix by the addition of chemical ingredients, supplementing gypsum, of such character as to assure the proper degree of permeability, i.e., sufficient porosity of the walls of the mold to vent steam and gases.

2. Control of the water of crystallization of the plaster mix to provide a chilling effect sufficient to give the

(*Turn to page* 72, *please*)

NOPAK

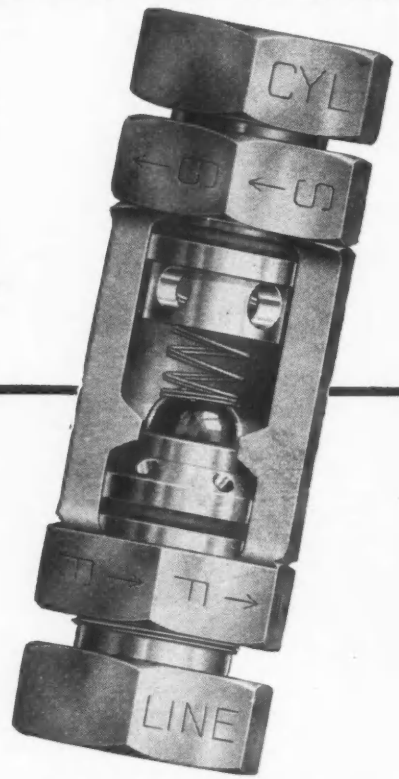
Presents

FLO-TROL

Speed-Control Valve

Designed for

- ✓ MORE ACCURATE CONTROL OF CYLINDER SPEED
- ✓ PRECISION AND STABILITY OF ADJUSTMENT
- ✓ EASY INSTALLATION



The new Flo-Trol Valve not only meets the need for more accurate control of cylinder speeds, but provides many operating and installation advantages:

- Quick, Easy Adjustment — without tools, no screws or lock-nuts.
- Greater Capacity — six times that of conventional valves.
- Precision Adjustment — remains stable, because of large seating area.
- Easy Installation — end-nut functions as pipe union, makes Flo-Trol easy to install or remove in "tight places."
- Rust and Corrosion Proof — all-bronze construction.

Write For Illustrated Bulletin

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Representatives in Principal Cities

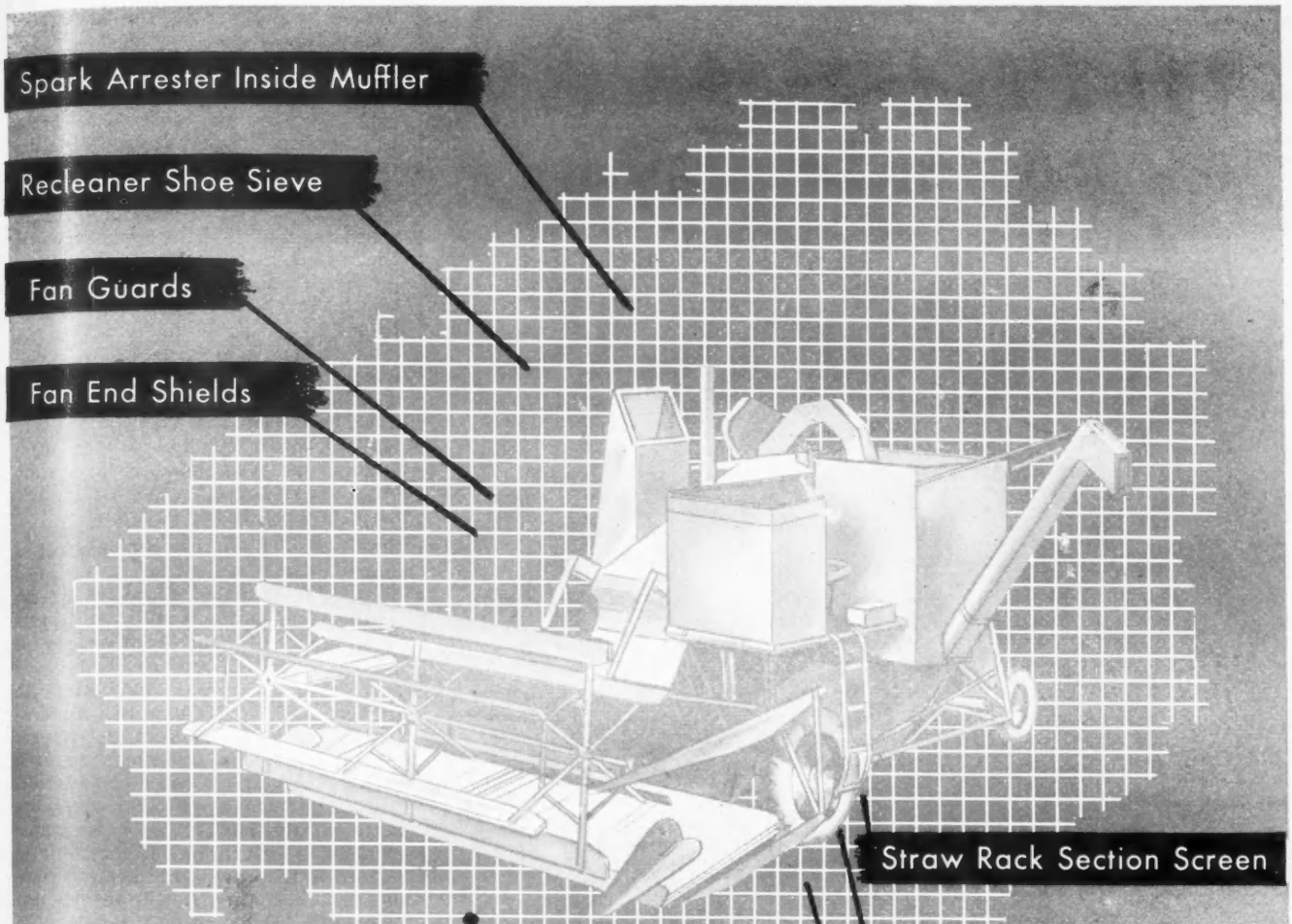
If you don't know your nearest NOPAK Representative, write for his name and address.

NOPAK

VALVES AND CYLINDERS

DESIGNED for AIR and HYDRAULIC SERVICE

A 5437-1P-AA



wire cloth

FOR SELF-PROPELLED HARVESTERS

American harvests and American harvesters have supplied the war-torn world with grain while reconversion to peace progresses. The millions of bushels of grain must be harvested at just the right time to avoid spoiling; and to achieve this the self-propelled harvester has been developed. It will save time, labor and fuel—and will collect the precious grain efficiently, shaking and screening off the chaff and storing the grain in the large bin. In all harvesters, Reynolds Industrial Wire Cloth plays a vital part. The dependability of the Reynolds cloth has proven itself over and over again on the farmlands of America, where grain is grown to feed the world.

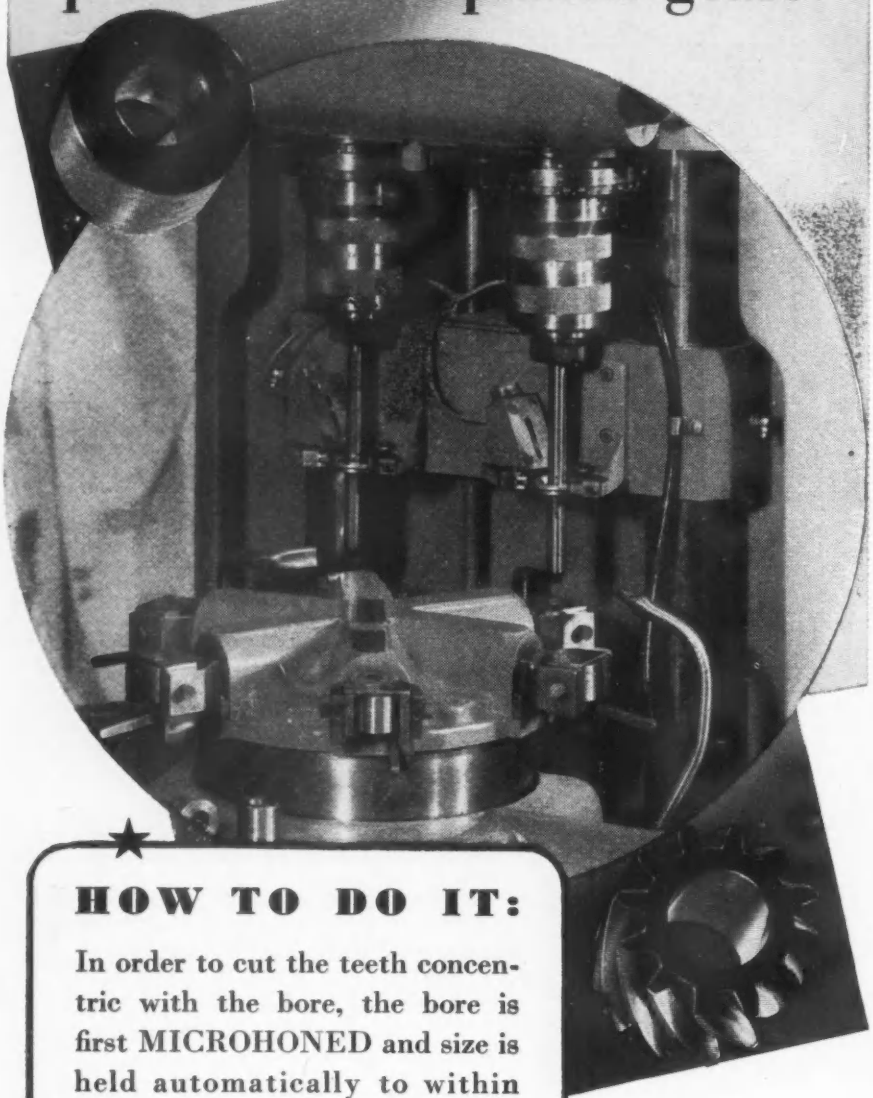
Reynolds Industrial WIRE CLOTH

REYNOLDS WIRE CO.

DIXON, ILLINOIS

MICROHONE★

for 300% to 400% MORE production of pinion gears



HOW TO DO IT:

In order to cut the teeth concentric with the bore, the bore is first MICROHONED and size is held automatically to within .0003″. The blanks are pressed on an arbor and the teeth are cut. After heat treating, the bore is again MICROHONED to correct any distortion caused by heat treating and to generate any desired surface finish.

No pitch diameter wobble!

★Trademark Reg. U.S. Pat. Off.

MICROMATIC HONE CORPORATION
8100 Schoolcraft Avenue, Detroit 4, Michigan

DISTRICT FIELD OFFICES:

1323 S. Santa Fe, Los Angeles 21, California
616 Empire Bldg., 206 S. Main St., Rockford, Ill.
55 George St., Brantford, Ont., Canada
Micromold Manufacturing Div., Boston Post Road, Guilford, Conn.

desired cooling rate for solidifying the metal.

Fruits of the first objective are exemplified in the present method of preparing the dry mix. Production begins with the preparation of a dry mix consisting of gypsum, sand, chemical inhibitor and accelerator. These are weighed carefully, mixed intimately and then transferred to the wet mixing machine. Here water is added in metered quantity and thoroughly mixed with the dry materials to form the wet mix. The wet mixing machine—completely automatic in its function—is mounted on a monorail and arranged for movement between the two pallet conveyors that carry the hundreds of individual mold sections. This mixture or slurry is poured through a flexible hose into molds and core boxes.

The second requirement, control of water of crystallization, is satisfied by the subsequent treatment of assembled molds. Actually, both permeability and control of water of crystallization of the finished molds are effected at the same time in the curing cycle which has a duration of some 48 hours. The plaster mix normally contains more than the desired amount of water of crystallization. It has been determined experimentally that if half of this water content is driven off, the residue is sufficient to provide the desired cooling rate of the mold. The mechanism of cooling in this case is found in the latent heat of vaporization as water is converted to steam, this heat being abstracted from the metal in the mold. By exercising proper control of this function it is possible to obtain fine grain structure and high physical properties.

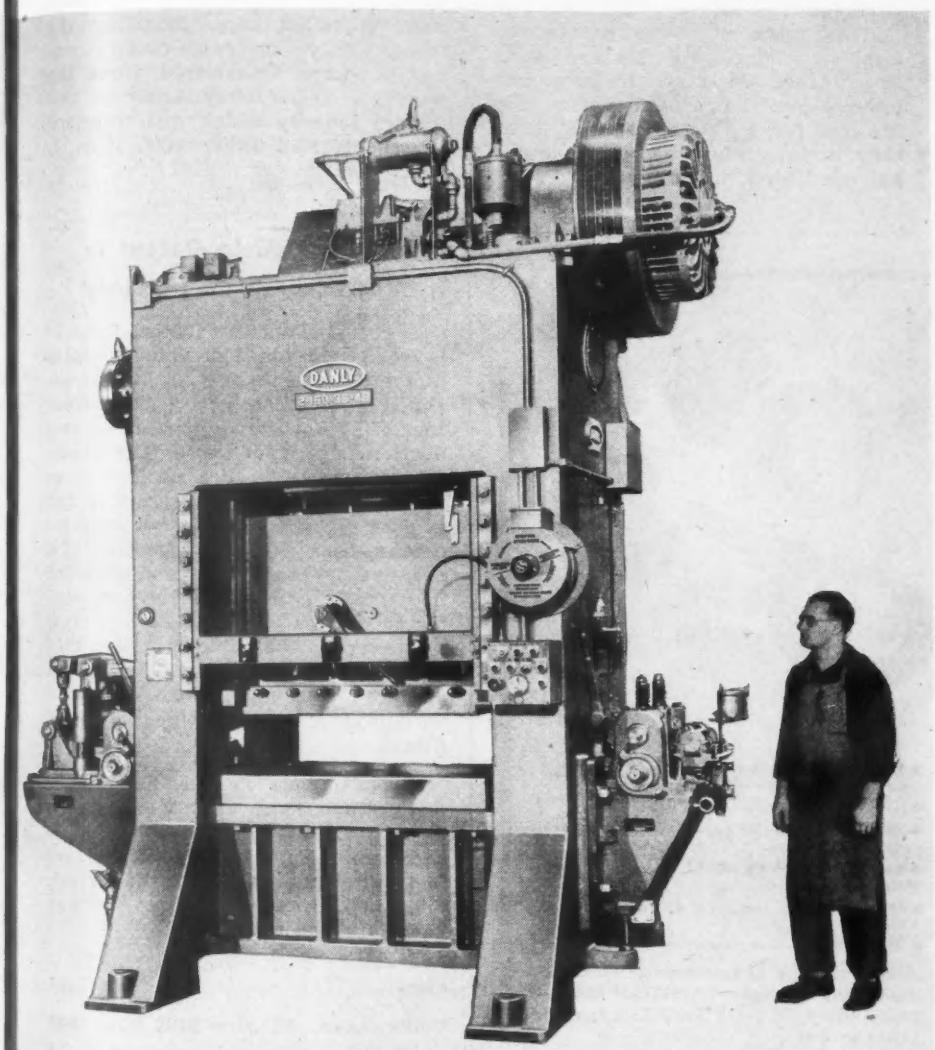
In keeping with mass production methods the plaster mold department has been mechanized to the fullest extent. To the observer it is more like a busy assembly line than a foundry since the make-ready of molds for pouring aluminum requires a tremendous number of individual plaster molds and plaster cores which must be assembled into cope and drag sections after the plaster mix has been poured and set. When the plaster parts of the molds have been assembled they are sprayed with kerosene, placed in racks and held at room temperature for six to eight hours. The racks then are moved by fork trucks into the large autoclave where the work is held for eight hours in an atmosphere under steam pressure of 17 psi. The racks are removed and molds cured at room temperature for 12 hours. Final step is to move the racks into drying ovens where work is held at 350 F for 20 hours.

In all, the treatment of plaster molds requires a cycle of 48 hours and this accounts partly for the high per pound cost of metal produced by the process. Needles to say any re-

(*Turn to page 76, please*)

REDUCES DOWN-TIME... STEPS UP PRODUCTION EFFICIENCY ON

DANLY PRESSES



* 8-Million Continuous Clutch Engagements Under Load with Negligible Wear

WRITE FOR MORE FACTS TODAY!

Main Mass of Clutch Rotates with Flywheel to Decrease Clutch Wear

The Danly Clutch and Flywheel Assembly described here is one of the several outstanding engineering features of Danly Presses which are reducing press down-time and stepping up production efficiency.

In designing the clutch and drive shaft assembly, Danly engineers effected a substantial reduction in the load picked up in the clutching operation.

How it is Accomplished

Most of the mass of the clutch is assembled *directly to the flywheel* and rotates with it. The clutch housing is also a ventilating fan which draws off the small amount of heat generated by the clutching action. The *friction discs and their retainer are the only actual clutch members which must be picked up by the flywheel* upon clutch engagement. This mass is approximately 1/7 that of conventional clutch designs. It is this factor which reduces the amount of wear on the clutch and increases production efficiency through less down-time.

engineering service... For assistance in determining the most efficient press for your production call on Danly engineers. Send details about your problems. Without obligation, you will receive specific recommendations.

get this folder

Write *today* for facts about other Danly Press features which are especially engineered to reduce down-time and step up production efficiency. Standard presses are available in capacities from 100 to 3000 tons. Write for this folder.

DANLY MACHINE SPECIALTIES, INC.

2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

MECHANICAL PRESSES AND PRESS EQUIPMENT

duction in process time and any substitution of dry sand parts for plaster parts will contribute to lower cost. The effect of the treatment is to remove all free moisture as well as to reduce about 50 per cent of the water of crystallization.

Unlike conventional practice the Antioch process involves two stages of pouring—filling molds and cores with the wet plaster mix, and pouring the metal later on. Metal pouring is done while molds move on the pallet conveyor, pouring by gravity. Molds are self-supporting, do not require cope or drag boxes.

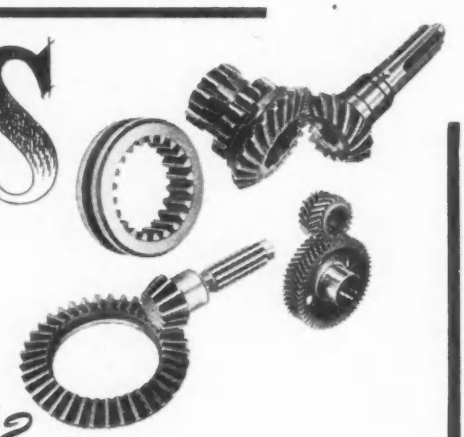
Shake-out is conventional, the parts being then transferred to a band saw for removing sprues. Castings are placed on a conveyor for initial inspection including removal of light flash by hand. The last mechanical operation is a treatment in a large Vapor Blast machine—using 100-lb. air pressure and wet grit—for thoroughly removing all plaster from cored passages.

Heat treatment of castings follows final inspection. To this end parts are packed in steel baskets and lowered into the furnaces where they are held for six hours at 960 F. Then they are quenched in boiling water and aged for five hours at 500 F.

To assure soundness and freedom from porosity the pump castings are subjected to a pressure of 110 psi while clamped in a test fixture. The outer surface is sprayed with a soap solution to aid in detecting leaks.

The dry sand molding department too is completely mechanized. It is interesting that some of the equipment installed here, including the heavy duty merry-go-round conveyors, were transferred from the war time Delco-Remy Anderson aluminum foundry which was described in AUTOMOTIVE INDUSTRIES, Nov. 1, 1942.

GEARS

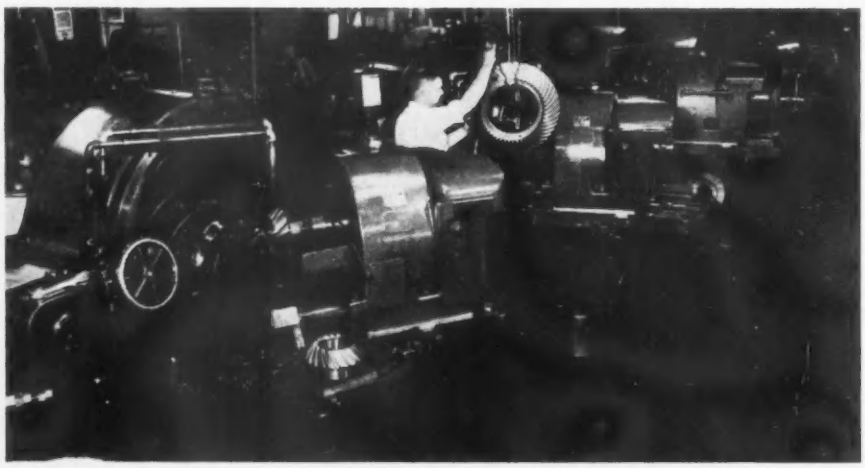


WHAT KIND do YOU need?

IF YOU use gears in the product you make, we believe it will pay you, as it has many others, to become acquainted with FAIRFIELD—the place where fine gears are produced to meet your specifications EFFICIENTLY, ECONOMICALLY! Fairfield's production facilities are unexcelled for making the following types of gears:

- **SPUR.** Straight, helical, and internal. Sizes from 16 pitch, 1½" dia. (approx.), to 1½ pitch, 36" dia., (approx.).
- **HERRINGBONE.** Sizes from 1½" to 15".
- **SPIRAL BEVEL.** Sizes from 16 pitch, 1½" dia. (approx.), to 1½ pitch, 28" dia., (approx.).
- **STRAIGHT BEVEL.** Sizes from 16 pitch, 1½" dia. (approx.), to 1½ pitch, 28" dia., (approx.).
- **HYPOID.** Sizes from 1½" to 28" dia. (approx.).
- **ZEROL.** Sizes from 16 pitch, 1½" dia. (approx.), to 1½ pitch, 21" dia.
- **WORMS AND WORM GEARS.** Worms to 7" dia. Worm gears to 36" dia.
- **SPLINED SHAFTS.** Lengths to 45", diameters from 1" to 6".
- **DIFFERENTIALS.** Complete units.

Ask for a copy of interesting, illustrated descriptive brochure. FAIRFIELD MANUFACTURING CO., 319 South Earl Avenue, Lafayette, Indiana.



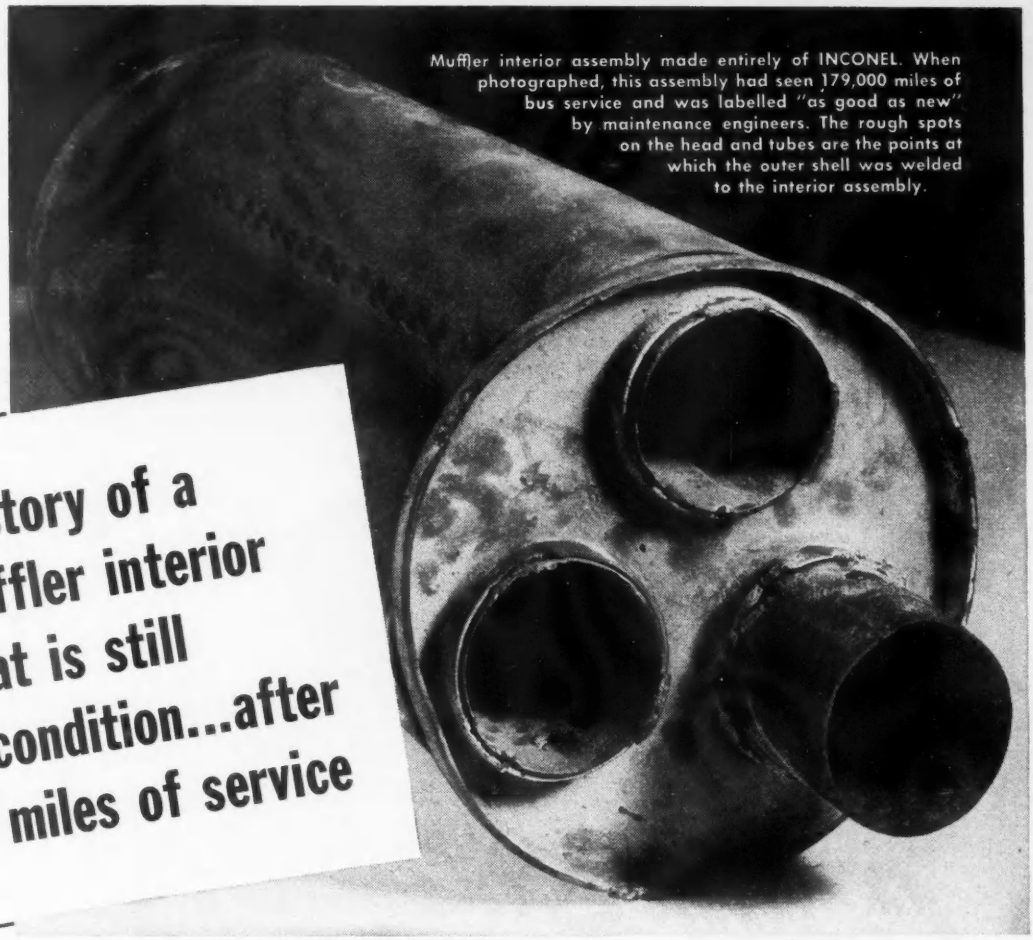
FAIRFIELD for FINE GEARS

Motor Vehicle Output in British Zone of Germany

A report from the British Zone in Germany reveals that while the total motor vehicles production in 1947 declined approximately 21 per cent from that of 1946, there was increased production of certain items. The greatest increase, 370 per cent, was in Deutz tractors. Normag tractors ran a close second with 355 per cent increase. The smallest increase, 31.4 per cent, was in the production of buses. International Harvester tractor production increased 120 per cent. A survey of the table discloses that the actual number of motor vehicles produced was small when compared with production figures for the United States.

The decrease in the number of units produced in 1947 is attributed to the lack of power, raw materials and competent personnel. Motor vehicle production data of the British Zone in Germany for three postwar years are given here.

Cars:	1945	1946	1947
Volkswagen, 4-seater	2499	9931	8940
Trucks:			
Tempo, ½ ton, 3-whlr.	796	1665	1096
Borgward, 3 ton	—	1164	683
Ford, 3 ton	2438	4649	2600
Bussing-NAG, 5 ton	1032	1507	908
Bussing-NAG, 53-seater	37	175	230
Transporters:			
Hanomag, 100 hp	154	305	136
Tractors:			
Deutz, 11hp	—	81	381
Intern. Harvester, 20 hp	—	92	202
Hanomag, 40 hp	697	1377	1117
Normag, 24 hp	—	71	323
Ritscher, 24 hp	—	77	—
Total	7653	21094	16616



Muffler interior assembly made entirely of INCONEL. When photographed, this assembly had seen 179,000 miles of bus service and was labelled "as good as new" by maintenance engineers. The rough spots on the head and tubes are the points at which the outer shell was welded to the interior assembly.

The story of a bus muffler interior that is still in good condition...after 179,000 miles of service

Not so many years ago you were considered lucky if you could keep a bus running for 150,000 miles. The thought of keeping a bus on the road for more than a million miles would have been considered fantastic. Yet, today, buses are being built that will do just that . . . *deliver a million and a half miles of road service.*

What are the reasons for this enormously increased service life? Improved design is one reason. But an even more important reason is *improved materials.* Today manufacturers have better rubber, better steel, better cast iron.

Here's an example of how improved materials can produce an astonishing (by earlier standards) increase in service life:

Bus mufflers are notorious trouble makers. They burn out, corrode away, and shake themselves to pieces so quickly that a bus has to be laid up ten times or more during its life. To correct this expensive weakness, engineers of a bus manufacturing concern built a muffler with tubes, heads, and rings made of INCONEL. The outer shell was made of hot rolled steel. This is what happened when the muffler was put into service —

After 70,000 miles, the shell wore out and was replaced with a specially-treated steel one. 52,000 miles later the second shell wore out and was replaced with another of the same material. This lasted for 57,000 miles. A total of three shells was required for 179,000 miles of service. *But the original INCONEL muffler interior was still as good as new!*

The bus engineers made this report: *"The muffler tubes, heads, and rings made of Inconel were in perfect condition after 179,000 miles of test. If the entire muffler had been made of Inconel, we estimate that it would have lasted for at least 400,000 miles."*

The results of this service test are important to you, whether you are a builder or operator of vehicles. This is but one of countless instances where INCONEL has shown its ability to give improved performance and cut maintenance. Wherever a metal is needed that has excellent resistance to continuous red-heat temperatures, corrosion, and vibration – specify INCONEL. You'll find that it will pay for itself many times over in reduced lay-up time and lower repair costs.

Other Inco Nickel Alloys may help you with different problems. Remember our Technical Service Department is always ready to help. A letter to C. J. Schrefer, Mechanical Section, Inco Nickel Sales, will assure prompt action.

*Reg. U.S. Pat. Off.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCONEL*... for long life at high temperatures

(80 NICKEL—14 CHROMIUM)

PUBLICATIONS AVAILABLE

(*Continued on page* 56)

titled New Horizons with Microcastings has been released by the company. It contains many interesting examples of parts produced by the Microcast process. The booklet is fully illustrated and, in addition, lists parts suitable for quantity production by this technique as well as range and type of alloy. Physical and chemical properties of Vitallium castings produced by the Microcast process are also given.

L-50—100th Anniversary Booklet

Farrel-Birmingham Co.—To commemorate the 100th anniversary of the founding of its original unit, the Farrel plant in Ansonia, Connecticut, a booklet in six main divisions has been brought out which covers, elaborately, the company's history, its present status and operations and lists its products of which the principal ones are briefly described and illustrated.

L-51—Powdered Metal Parts

Powdered Metal Products Corp.—The company has made available a new folder containing information on powdered metal parts and its facilities for producing them. The folder includes a page of text and drawings on suggestions to the engineer on how to design parts for production in powdered metal. Another page contains tables giving the average physical properties of PMP Powdered Metal Parts.

L-52—Economic Cooperation Adm. Booklets

Economic Cooperation Administration—A booklet, American Business and European Recovery, which outlines the operations of the Economic Cooperation Adm. is available. The booklet explains that ECA is a financing agency and not a purchasing agency and that American businessmen's contacts should be with the foreign businessman, the foreign government and the export license office of the U. S. Dept. of Commerce. It briefly outlines the buying methods of the various participating countries and lists addresses of foreign purchasing missions and embassies.

Another ECA booklet, Information for Americans Going Abroad, gives the background of the European Recovery Program and explains the operation of ECA particularly for those who are planning trips to Europe.

L-53—Cylindrical Grinders

Landis Tool Co.—The Landis Tool Type F series of hydraulic cylindrical grinding machines is described and illustrated in Catalog F-48. This series consists of Plain, Gap and Roll grinder and are made to accommodate maximum work diameters of 14, 16, 20 and 24 inches, in varying lenghts up to 240 inches between centers. Complete specifications are included for each of the four types of precision cylindrical grinders presented. Illustrations and line drawings are used to clearly present the features of the new machine.

L-54—Load King Scales

Yale & Towne Mfg. Co.—Six new technical bulletins, in color, and totaling 68 pages of data, diagrams, selection advice and practical application information on dial scales, are offered to production managers, traffic men, etc. In the Counting Scale Bulletin, platform styles and sizes,

(*Turn to page* 80, *please*)

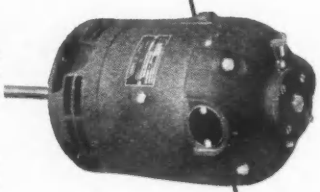
A name synonymous with good MOTOR performance...

Lamb Electric

Efficient operation combined with thorough dependability have won for Lamb Electric Motors a reputation for unexcelled performance.

Because of their outstanding performance, Lamb Electric Motors are going into more and more of America's finest motor-driven products, including home appliances, business machines, portable electric tools, aircraft components and portable devices.

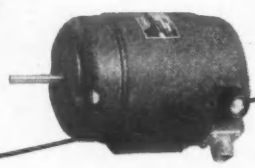
THE LAMB ELECTRIC COMPANY
KENT, OHIO



This motor is used extensively on such products as: industrial vacuum cleaners, agitators, sirens and colloid mills.

Space factor in this power unit is minimized by having output shaft at right angles to motor shaft.

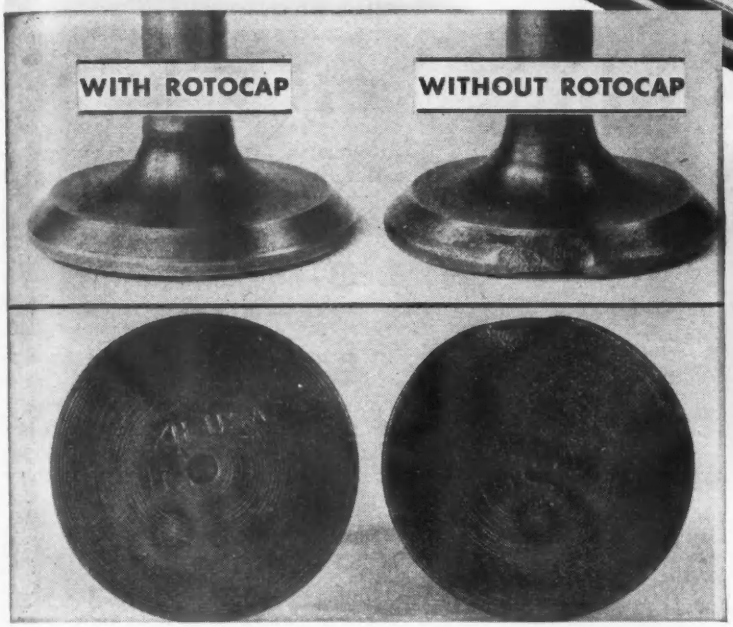
Universal motor used for commercial vacuum cleaners, wheel balancers, air compressors, etc.



This small sturdy motor can be readily adapted to a wide range of industrial applications.

Lamb Electric
SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

THE NEW Thompson ROTOCAP gives two to five times LONGER VALVE LIFE!



The ROTOCAP is supplied completely assembled and attaches to the valve tip with conventional split-type valve retainers.

A TRUCK MANUFACTURER'S TEST

Unretouched photographs of two exhaust valves after 538-hour dynamometer test by a leading truck builder. The test was made under full load at 3200 r.p.m. in a 6-cylinder heavy-duty engine. The top and side views of the valve at the right, used without the ROTOCAP, show severe burning, warping and pitting. Note the clean, undamaged condition of the valve at the left, which was fitted with the ROTOCAP. As a result of this and other road and laboratory tests the manufacturer adopted the ROTOCAP.

Thompson improvements in precision parts engineering include Steel-Belted Pistons, U-Flex Oil Control Rings, Cylinder Sleeves, Valve Seat Inserts, Sodium-Cooled Valves, Valve Rotocaps.

THE IMPROVED POSTWAR ROTOCAP assures *positive* valve rotation at all engine speeds and at the rate of rotation best suited to each make of engine. Replacing the conventional valve spring retainer, it eliminates blow-by, sticking, warping, burning and pitting.

The constant wiping action of the turning valve keeps the valve face and block seat clean and smooth. Wear and heat are evenly distributed, assuring a lasting seal and efficient cooling. The rotating action also keeps the valve stem free in the guide.

Our own tests and those of engine builders who have adopted the ROTOCAP prove that it lengthens average valve life two to five times. For further information, write—

Thompson Products

CLEVELAND • DETROIT • LOS ANGELES • ST. CATHARINES, ONTARIO

dial capacities and special methods of application are discussed. Two of the bulletins cover portable platform scales and bench scales. Photographic illustrations of the many industrial uses for these scale types are shown. The dormant platform scale bulletin describes the new outboard bearing principle (fully illustrated) and other special design features. Another bulletin describing crane scales, includes dimensional drawings and capacity tables, helpful shop data on U-bolt suspensions and load hooks. Specification information is given in tabular form together with diagrammatic and pictorial illustration.

L-55—Resistance Welding

Sciaky Bros., Inc.—A collection of the company's Resistance Welding at Work Bulletins has been put in an attractive folder for easy reference. Some of the topics covered are the problems of flash welding aluminum; spotwelding, etc.

L-56—Sealing and Lubricating Compounds

The Parker Appliance Co.—Sealing Lubricating compounds for general purpose and specialized use are described in Catalog No. 909. Properties of valve lubricants and anti-seize compounds for many types of tubing and piping systems are described. Compounds especially developed for aluminum systems and systems handling oxygen, alcohol, aromatic and high octane fuels and other liquids and gases are among those listed.

L-57—Electronic Air Filters

American Air Filters Co., Inc.—Bulletin No. 257 describes and illustrates the Electro-PL dry type air filter, which consists of two components, a frame and a collector element. A cutway drawing of the collector element shows details of contruction, etc. A list of suggested specifications, design features, maintenance information, performance characteristics, installation data, capacity and dimension charts and an installation diagram are included in the booklet.

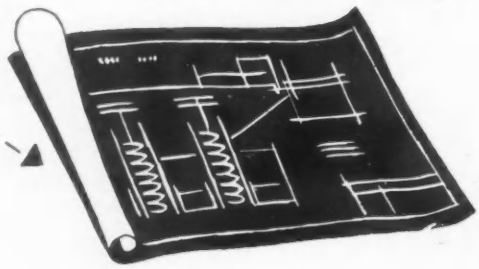
L-58—Balancing of Grinding Wheels

Cincinnati Grinders, Inc.—An article, Automatic Balancing of Grinding Wheels, describes a new development of the company's research laboratory, and is contained in an attractively illustrated folder recently made available.

L-59—General Catalog (Machine Tools)

The Cincinnati Milling Mach. Co.—A new general catalog containing information on the company's machines for milling, broaching, grinding, lapping, flame hardening, etc. is available. A short history of the company's progress through sixty years precedes sections on the various types of their machines. Complete descriptive text, illustrations and specifications for each type are included.

Do the FINAL Springs show in your Blueprints?



Wise design engineers make sure they have the exact springs for the product—when it's still in the blueprint stage. For they have learned that early spring selection pays big dividends in product quality, production economy and in avoiding trouble.

Before you specify the springs or wireforms for your new products, call in a Lewis Spring Engineer to help you select the most practical, economical springs for the job to be done. Lewis engineers have saved manufacturers thousands of dollars by recommending equally effective, but more economical springs than the ones originally specified. They are thoroughly experienced in all phases of spring design, manufacture and applicability to products and welcome the opportunity to help you with spring problems.

Regardless of your production plans — whether your spring requirements are large or small, or they're yet indefinite—Lewis will be glad to work with you. But call in the Lewis Spring Engineer *early*, while he can help you specify and save you money.

LEWIS SPRING & MANUFACTURING COMPANY
2644 WEST NORTH AVENUE CHICAGO 47, ILLINOIS

Lewis PRECISION SPRINGS
THE FINEST LIGHT SPRINGS AND WIREFORMS OF EVERY TYPE AND MATERIAL

Readers of

Automotive Industries

are Always

Well Informed

Long Manufacturing Division, Borg-Warner Corporation, Detroit 12, and Windsor, Ontario

New Swiss SSV Engine

(*Continued from page 44*)

There is no special oil delivery between the piston and the inner wall of the sleeve. Because of the element of elasticity in the sleeve, it is possible to fit pistons with rather less clearance than usual, this being 0.00039 in. on the skirt and 0.0039 in. between the two top rings.

All the valve operating gear is mounted on the base of the cylinder block, this latter being recessed into the crankcase. Thus the whole of the gear comes away with the cylinder casting, there being no external mechanism for adjustment or attention. Operation of the sleeve is by means of two eccentric shafts, one operating at engine speed and the other at half speed. Two coupling links engage with the lugs on the base of the sleeve, but are full floating so that it is impossible to transmit any effort other than in an axial direction. In other words the sleeve is free to expand, and obviously must expand on the compression and power strokes. To assure rigidity in the operating gear, the four ends of the operating links are united by two bridge pieces.

For 30 min. at the completion of 300 hr on the test bench without dismounting, the experimental engine was run at 3500 rpm under three-quarter load, and for the last three minutes it was run at 4500 rpm. The limiting factor was not the engine, but the inability of the dynamometer to take care of sustained high speeds. Further tests are being prepared at 5000 rpm and upwards, under full load.

All the bench tests were made with a compression ratio of 7.5 to 1. Two Solex vertical 0.866 in. carburetors were used with standard low grade gasoline. Spark plugs were Champion LA 14. The power curve showed 30 hp at 3000 rpm, 35 hp at 3500 rpm and 39 hp at 4000 rpm. Gasoline consumption was 0.55 lb per hp hr at 3000 rpm and 0.52 lb at 3500 rpm. A max. bmep of 126 was attained at 2700-3700 rpm.

Valve timing was as follows: Intake opening 10 deg after top dead center; inlet closing 49 deg after bottom dead center; exhaust opening 49 deg before bottom dead center; exhaust closing 10 deg before top dead center.

Immediately on completing its tests, the engine was stripped for examination. An unusually small amount of carbon was found on the detachable bronze heads and on the pistons. There were no local deposits and nothing to indicate that excess oil reached the combustion chamber, although the seting gave an oil pressure of 71 psi and this pressure was maintained with an unventilated crankcase during bench tests. Frequently during the tests the exhaust pipes were detached and the engine accelerated, but there was no more tendency to smoke than on a conventional poppet valve engine in good condition.

There was a very small amount of easily-detached carbon in a corner of one of the exhaust ports. The sleeve had a mirror-like finish, particularly immediately to left and right of the slot, but there was nothing to indicate any gas leakage. The piston skirts, at the point where they came opposite the slot had a very faint discoloration. Around the ports and on the top edge the sleeve had taken on a brown tint, but without traces of burning. At certain points the outer-surface of the sleeve had become bronzed, without traces of wear, this slight discoloration probably being a chemical action between the two metals. No adjustments were necessary and no other work required than the removal of the thin layer of carbon from piston heads and cylinder heads.

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Millions Used Monthly By Automotive Manufacturers

Labor's Next Battleground

(*Continued from page* 31)

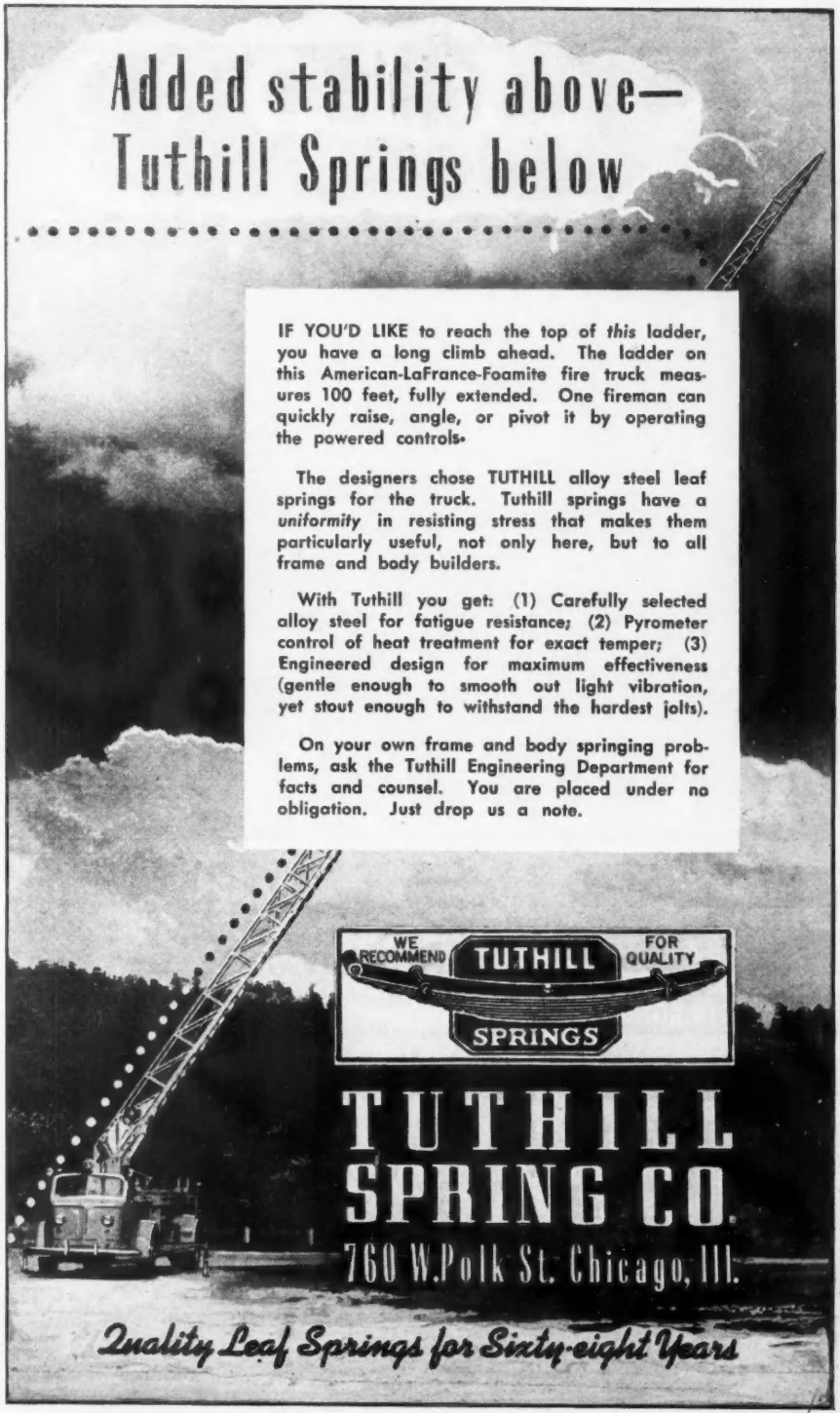
scattered not only throughout the industry but even at different plants of the same company. For example, the Douglas Long Beach plant is UAW-CIO whereas its Santa Monica and El Segundo plants are IAM. This scattered pattern inevitably subjects the industry to frequent and bitter labor "raids" by both unions and smaller crafts unions which, in turn, ties up small but often vital shops with its plants. Biggest and most serious new "raider" in the industry is Dave Beck's powerful AFL Teamsters Union, which has taken advantage of the Boeing situation with a lightning attack. The crippling Boeing strike began late last April when 14,800 members of Local 751 IAM walked out. Boeing management immediately charged the union with a violation of the law since the 60-day strike notice required by the Taft-Hartley law had not been observed. The local was further put in a bad light by the statement from the IAM executive council in Washington, D. C. that it had not authorized the strike and therefore would not provide strike donations or other financial aid. Boeing sued the union for $2,250,000 strike damage and declared that since the strike violated the law it abrogated the contract and that Boeing was legally free to hire new workers. Hiring began immedialy with a 15c increase and reached more than 100-a-day. Into this situation moved Dave Beck, who publicly agreed with the company, by dispatching 12 organizers to the plant. His AFL Teamsters union began signing up warehousemen, parts men and transportation department employes until a majority of the 5000 workers eligible had been made members.

Boeing immediately began shifting major portions of its $300,000,000 worth of military and commercial business to its Wichita plant and subcontractors in Oregon and Southern California. Boeing President William Allen states that this increased subcontracting plus increased worker efficiency will permit the company to maintain its scheduled level of output with 5000 less workers than were employed at the time of the strike.

The industry is therefore caught between irresponsible labor organizers on the one hand and Walter Reuther's boldly-planned program on the other. Reuther has taken personal charge of the aircraft department of his union and launched his program of "labor participation in managment" in full force. He asked President Truman to call a nationwide aviation labor-management conference to "discuss the 'critical' situation" but was turned down. He then announced a number of programs designed to train new workers in the special skills required, to permit labor participation in the production and personnel programs, to evolve long-term policies, etc. none of which have yet received acknowledgement from aviation management.

There is little question but what the aircraft industry will hear more and more about "industry councils, industry-wide bargaining, annual wages, universal job descriptions, pensions, equal pay for equal work, etc." in the coming months. With aircraft workers scheduled to increase from 185,000 to about 300,000 by 1950 this industry offers a fertile field for labor in view of the increasing solvency of the industry and the national-interest character of its business.

The industry does have, however, several factors useful in preserving the labor-management balance. The industry is concentrated in areas having adequate and even surplus labor supplies, which permits new hiring on short notice and removes the "tight labor" weapon of unions in other areas. It is confined by law to


Added stability above—
Tuthill Springs below
IF YOU'D LIKE to reach the top of this ladder, you have a long climb ahead. The ladder on this American-LaFrance-Foamite fire truck measures 100 feet, fully extended. One fireman can quickly raise, angle, or pivot it by operating the powered controls.
The designers chose TUTHILL alloy steel leaf springs for the truck. Tuthill springs have a uniformity in resisting stress that makes them particularly useful, not only here, but to all frame and body builders.
With Tuthill you get: (1) Carefully selected alloy steel for fatigue resistance; (2) Pyrometer control of heat treatment for exact temper; (3) Engineered design for maximum effectiveness (gentle enough to smooth out light vibration, yet stout enough to withstand the hardest jolts).
On your own frame and body springing problems, ask the Tuthill Engineering Department for facts and counsel. You are placed under no obligation. Just drop us a note.
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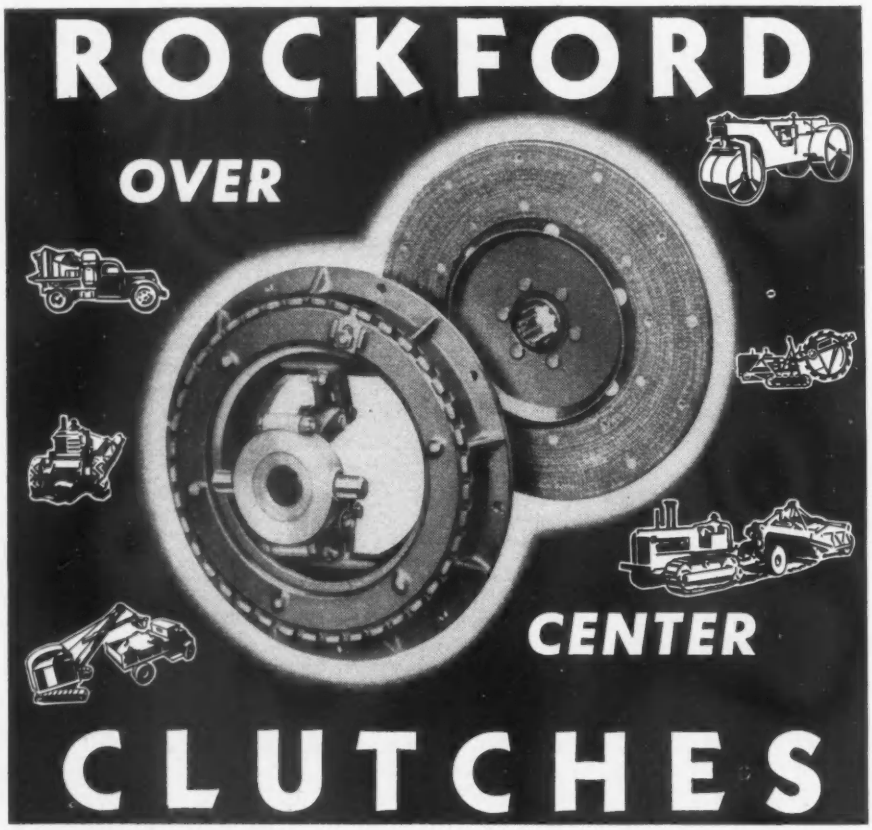
comparatively low profits which discourages union claims on profit-sharing. The major airframe manufacturers are not subject to seasonal fluctuations in production, removing the "annual wage" as a bone of contention, although this may become a factor in the personal aircraft group of companies. It does not yet have an industry-wide bargaining agent and the erratic union pattern throughout the industry may prevent industry-wide bargaining for some years to come. The industry is unique, too, in the intergrated nature of its production-engineering-management employe structure which makes it difficult to produce horizontal levels of personnel desirable by unions.

Haivng fought and won its battle for an adequate level of aircraft procurement necessary to sustain an industry nucleus capable of rapid expansion in an emergency, the industry's problems are not yet over. Work stoppages can and will disrupt the planned financial recovery of the industry as a national asset until legislation enacted to equalize the management-labor balance of power is courageously and wisely enforced. The new administration is pledged to do just that.



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* ROCKFORD Over-Center CLUTCHES remain in or out of engagement until changed by the operator. The smooth, easy, anti-friction engagement —obtained by roller cams pressing against the pressure plate face — progresses from "release" to "on center" to slightly "over center" where the clutch locks in engaged or running position.

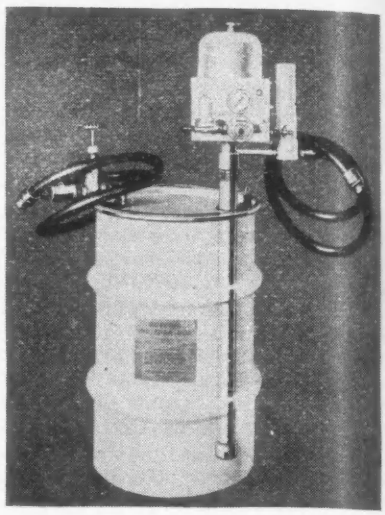
Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

B-W ENGINEERING PRODUCTION

ROCKFORD CLUTCH DIVISION BORG-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.

Positive Pressure Pump



The J. J. Siefen Co., Detroit, Mich., offers this air operated positive pressure pump for spraying buffing and polishing compounds to revolving wheels. The pump furnishes compound to the spray guns, circulates it, and returns it to the drums. This action not only assures sufficient compound to each gun but also serves to mix the material in the drum.

CALENDAR

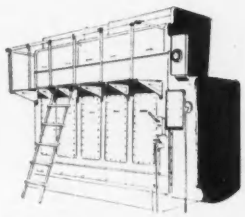
Conventions and Meetings

SAE West Coast Mfg., San Francisco.. ..... Aug. 18-20
Wisconsin Centennial Automotive Expo. Milwaukee .....Aug. 27-29
Amer. Chemical Soc., Washington D. C. .....Aug. 30-Sept. 3
Natl. Air Races, Cleveland .....Sept. 4-6
SAE Tractor & Diesel Eng. Mfg. Milwaukee .....Sept. 7-9
Soc. of British Aircraft Constructors Annual Air Show, Farnsborough.. ..... Sept. 7-12
International Foundry Congress, Prague ..... Sept. 12-19
Instrument Soc. of Amer., Natl. Instrument Conf. & Exhibition, Philadelphia .....Sept. 13-17
Industrial Experimentation Training Conf., Columbia University ...Sept. 14-18
Turin (Italy) Auto Show .....Sept. 15-26
Natl. Assoc. of Foremen Convention & Silver Anniversary, Phila. ...Sept. 23-25
3rd Natl. Plastics Expo., New York City .....Sept. 27-Oct. 1
Commercial Motor Transport Show, London .....Oct. 1-9
New England Materials Handling Exposition, Boston .....Oct. 5-7
SAE Aeronautic & Aircraft Eng. Display, Los Angeles .....Oct. 6-9
Paris Auto Show.....Oct. 7-17
American Soc. Tool Engineers Convention, Los Angeles .....Oct. 11-13
Inst. of Traffic Engineer Annual Mtg. Phila. .....Oct. 11-13
Natl. Safety Council Safety Congress & Expo., Chicago .....Oct. 18-22
SAE Production Mtg., Cleveland ..Oct. 21-22
Amer. Welding Soc. Annual Mtg., Phila. .....Oct. 25-29
Amer. Soc. for Metals Nat'l. Metal Congress & Expo., Phila. ....Oct. 25-29
London Passenger Car Show ..Oct. 27-Nov. 6
Society of Motor Mfrs. International Motor Exhibition, London..Oct. 28-Nov. 6
Amer. Soc. Body Engineers, Annual Convention, Detroit .....Nov. 3-5
SAE Fuels & Lubricants Mtg., Tulsa .. .. Nov. 4-5
Automotive Service Industries Show, Navy Pier, Chicago .....Dec. 6-10
SAE Annual Mtg., Detroit .....Jan. 10-14
Natl. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco..Jan. 24-27

What New Advantages Can You Add to Your Product?

You'll find unusual combinations of physical properties to meet your needs for improved product performance and appearance in Continental-Diamond high-strength plastics. Take *Celoron*, for instance, used in the gear shown here. This versatile material provides strength, resiliency, light weight, as well as moisture, heat, and corrosion resistance. Moreover, it is readily workable . . . can be tapped, drilled, shaped, milled, and threaded with ease.

And *Celoron* is but one of many C-D materials that can help to add new advantages to your product. Whatever your application, see Continental-Diamond first for recommendations that lead to higher product quality and appearance . . . lower fabrication costs. Your nearest C-D office has trained technicians with additional information that will interest you. Call or write, any time.



Another C-D Case of Improved Performance

Making a huge, 2-foot timing gear for Diesel Locomotives always presents problems. The gear had to be strong enough to stand terrific strains —yet resilient enough to absorb shock. Dimensional stability, quiet performance, and easy machining were basic requirements. *Celoron* is proving its ability on applications like this, and a host of others where mechanical precision and rugged operation are needed.

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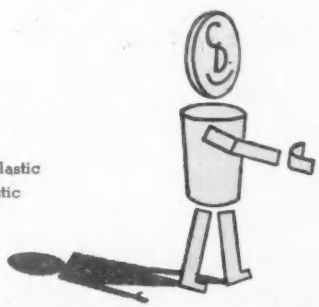
VULCOID—Resin Impregnated Fibre
DILECTO—Laminated Thermosetting Plastic
CELORON—Molded High-Strength Plastic
MICABOND—Bonded Mica Splittings

DM-4-48



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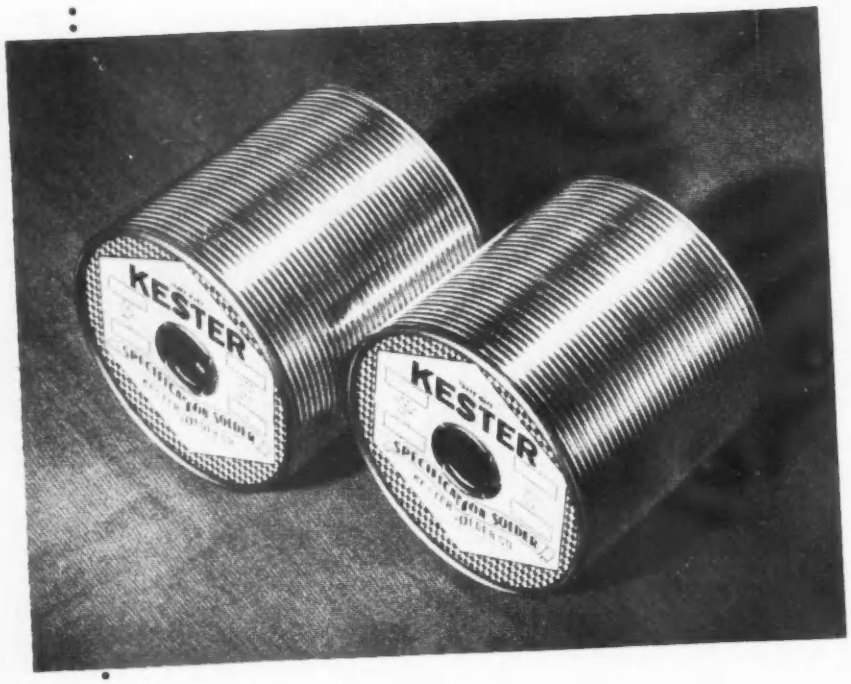

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In these days of high labor costs it is of the utmost importance to maintain peak efficiency in your production and maintenance operations. Kester Cored Solders will speed up all soldering jobs.

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An Analysis of Six-Cylinder Engines

(*Continued from page* 34)

Rocking couples can be eliminated by resorting to the horizontal opposed or flat construction. The rocking couples on the two cylinder banks then act in the same plane, and by selecting a suitable crankshaft design they can be made to cancel out. A number of such six-cylinder opposed engines are now being produced for installation in light airplanes. Fig. 5 is a diagram of the crank assembly of such an engine. A six-throw crankshaft is used, and pistons in cylinders most nearly opposite each other are connected to crankpins 180 deg apart. In Fig. 6 are plotted the momentary primary and secondary inertia forces in all six cylinders when pistons in cylinders 1 and 2 are at the outer end of their strokes. Secondary forces are plotted to about four times the scale of the primary. It will be seen that the distribution of forces along the length of the crankshaft is the same in both cases. By taking moments around any point along the length of the shaft it will be found that these vanish completely, and that both primary and secondary inertia forces therefore cancel out.

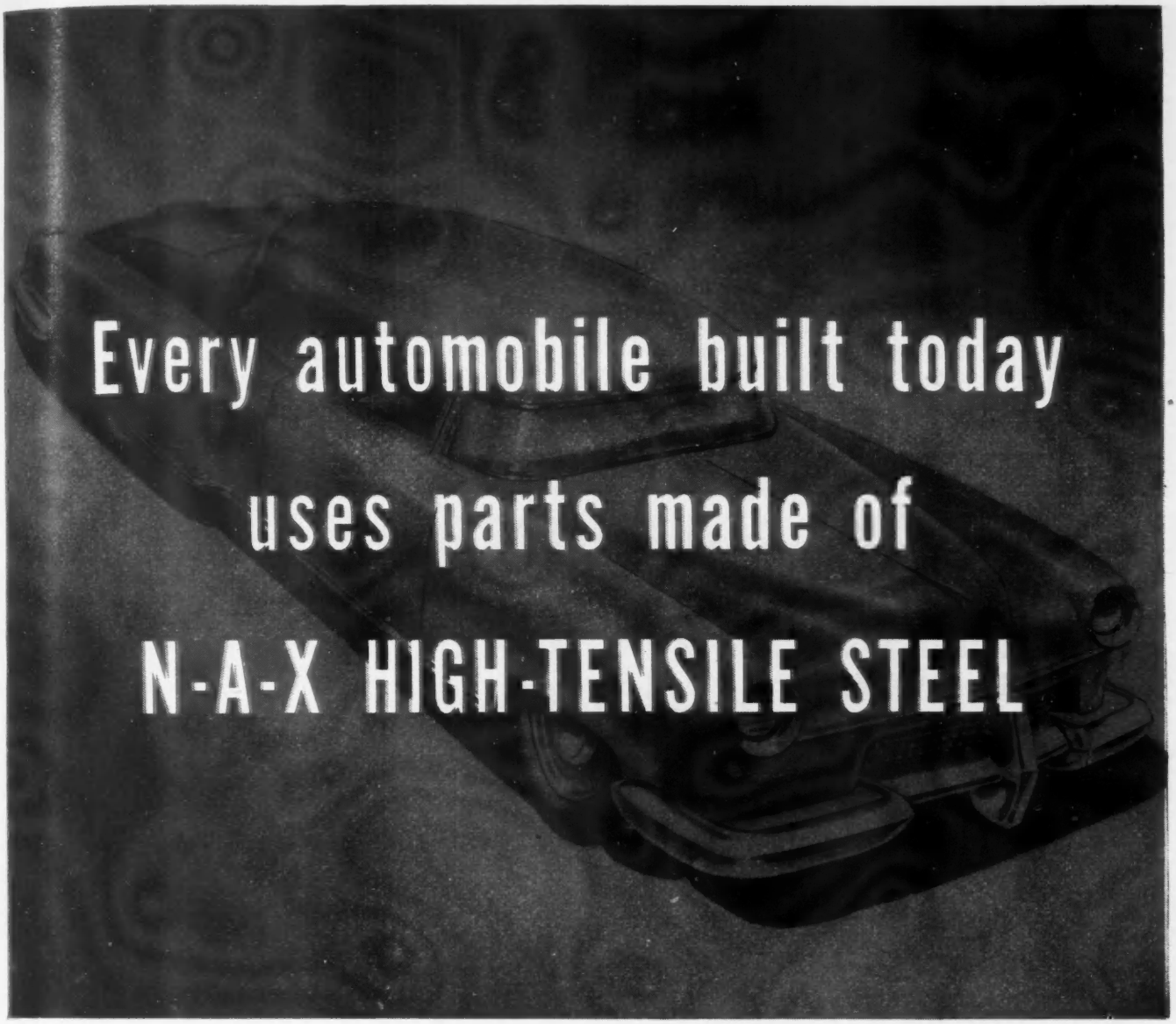
Owing to the fact that pairs of adjacent cranks (1 and 2, 3 and 4, 5 and 6) are 180 deg apart, the inertia forces on them are directly opposed, except for the offset between cylinder banks, and a main bearing between these pairs of cranks therefore probably can be dispensed with to advantage. That leads to an engine with four main bearings.

Observations

(*Continued from page* 68)

Industrial Wastes

A recent issue of "The Houghton Line" contains a specially prepared article dealing with the disposal of industrial wastes. That is one of the biggest headaches facing large metal working industries. Certain types of common industrial wastes are deadly to fish in streams while other contaminants are toxic to the bacteria essential to the operation of sewage treatment processes. Since the communities in which large industrial plants are located are beginning to pass special legislation for the control of industrial waste, it is imparative for the metallurgists and chemists to devise the most practical and economical means of control—and quickly.



Since 1940, when Great Lakes Steel pioneered the application of high-tensile, low-alloy steel to cold-stamped automobile bumpers, there has been a growing trend to N-A-X HIGH-TENSILE STEEL in the automobile industry.

Today, every car manufacturer is using the inherent better properties of N-A-X HIGH-TENSILE STEEL for some part of his automobile.

Bumpers and grilles – hoods and fenders–body panels and deck lids – frames and bracings – wheels and hub caps represent a few of many applications of N-A-X HIGH-TENSILE STEEL to the modern car.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify–
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GREAT LAKES STEEL CORPORATION
N-A-X Alloy Division • Detroit 18, Michigan
UNIT OF NATIONAL STEEL CORPORATION

British Reverse Gear

(*Continued from page 27*)

sure, the other circulates it. The position of a control piston in the distributing cylinder selects the pump to pass the pressure oil.

The oil strainer, gearbox control valve, and pressure adjusting valve are grouped in a common housing bolted to the port side of the gearbox.

Pressure oil delivered from one or the other of the pumps is led from the case to an external heat exchanger and from there back to the gearcase. On the main inlet pipe in the gearcase is mounted the maximum pressure relief valve and this inlet pipe connects to the oil box strainer compartment. Passing through the strainer, the oil contacts the control valve, the chamber in which this is situated also carrying the working pressure adjusting valve.

From this same chamber a connection is taken to a pressure-reducing valve, the low side of which leads oil to the gears and the bearings in the gearbox.

The rotary-type oil control valve has four outlet ports, arranged so that any one of the three conditions listed below can be obtained:

Neutral. Pressure oil to the forward and reverse clutch disengaging cylinders and the engaging cylinders connected to the exhaust side of the valve.

Forward. Pressure oil to the forward clutch engaging cylinder and the reverse clutch disengaging cylinder; the forward clutch disengaging cylinder and the reverse clutch engaging cylinder being connected to the control valve exhaust.

Reverse. Pressure oil led to the reverse clutch engaging cylinder and the forward clutch disengaging cylinder; the reverse clutch disengaging cylinder and the forward engaging cylinder being connected to the control valve exhaust.

The control valve incorporates a stop which prevents it from going into that position which would engage both forward and reverse clutches simultaneously. End stops, carried in the bronze clutch members, centralize these members when the clutch is in a neutral state.

The oil is carried to the clutch through the bearing cases and not, as is usual, through the shaft.

Making molehills out of mountains is duck soup for rugged "Cats." No job is too tough.

Since 1935 all Caterpillar engines have been Donaldson equipped, and for this new series of tractors, Caterpillar engineers again chose Donaldson Air Cleaners.

New developments in power machinery often present new problems in dust protection. Donaldson research, engineering and testing facilities are available to all manufacturers in solving these problems.

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DONALDSON Oil-Washed AIR CLEANERS

SALES ENGINEERS: CHICAGO • DETROIT • CLEVELAND

STEEL AWARDS

(*Continued from page 26*)

Republic Building, Cleveland 1, Ohio.

The following outline is presented as an aid in selecting names to be sent to the Awards Committee.

I. Men who discovered, perfected and promoted the metallurgical processes

1. Ferro-alloys and other raw materials

2. Equipment and processes for making alloy steel: furnaces; auxiliaries; control equipment; refining processes and reagents; alloy steel ingot and steel casting practice

3. Forging and other mill processes adapted especially to alloy steel

4. Heat treating techniques for alloy steels

II. Discoverers of advanced research techniques

III. Discoverers of improved inspection techniques

IV. Discoverers and perfectors of the alloy steels themselves

1. Compositions

2. Control and refinement of microstructure

V. Notable men in the organization and promotion of the alloy steel business

VI. Men responsible for notable applications in consuming industries

1. Transportation industries: automotive; railroad; aircraft; marine

2. Agricultural machinery

3. Power industries: steam; electrical; gas; water

4. Machine industries

5. Chemical and petroleum industries

6. Ordnance

Are you getting your share of

$21,600,000 SAVINGS PER YEAR

made possible by A-C welding?

4 out of every 5 welders in use today are d-c. Yet, actual operating figures prove that a-c welding is faster, cheaper and better.

It's time to forget old concepts of welding costs and efficiency—to reverse this ratio of a-c to d-c equipment in line with proved operating results. The potential savings are startling—conclusive evidence that you cannot afford to continue using d-c welding extensively.

SAVINGS IN WAGES—

Because a-c welding is 20% to 30% faster, permitting excellent welds at higher speeds on all classes of work, nearly $1,240,000 *monthly* can be saved in labor costs (at $1.50 per hour).

SAVINGS IN POWER—

Because a-c welding requires less power, giving 85% to 90% efficiency as against 55% to 65% for d-c machines, the potential *monthly* power saving is over $500,000 (at 2c per kilowatthour).

SAVINGS IN DEPRECIATION—

Because fewer a-c machines are required, potential savings of more than $18,800 per month can be realized (based on a capital charge of 1% per month).

SAVINGS IN MAINTENANCE—

Because a-c welders require less maintenance, potential monthly savings on maintenance total more than $60,000.

These add up to total monthly savings of more than $1,800,000, or $21,600,000 per year. These are "boxcar" figures, but they are backed up with facts.

A Westinghouse welding specialist is ready to give you these facts, and to show you actual dollars-and-cents savings possible in your plant by replacing d-c welders with modern a-c welding techniques and equipment.

Get in touch with your nearby Westinghouse office, and ask a welding sales engineer to call. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21449

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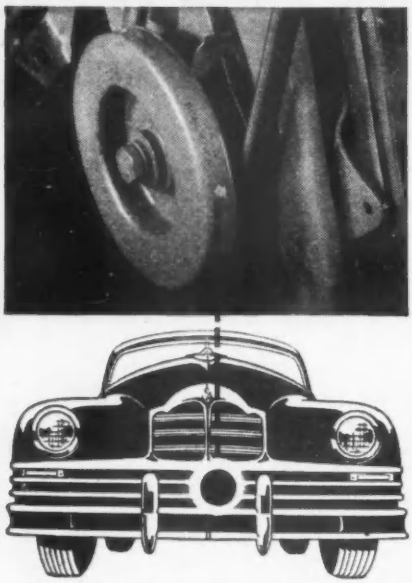
Silicone News

DC — SILICONES

Materials to Match Ideas



Packard adopts Houde Torsional Vibration Damper with DC 200 Silicone Fluid to absorb vibration of crankshaft.

Some of the best ideas die for want of the materials necessary to make them practical or for want of the time required to develop them. This might have been the fate of the ideas embodied in the Torsional Vibration Damper shown above. Use of a viscous fluid to smooth out the twisting motion of crankshafts was sound in theory—but impractical because there were no fluids which kept essentially the same consistency in use at high and low temperatures.

Engineers of the Houde Engineering Division of the Houdaille-Hershey Corporation were stymied until they requested samples of DC 200 Fluid in December 1944 and proved to themselves that this Silicone Fluid developed by Dow Corning had exactly the properties they needed. Even so, a great deal of time was required before the device could be perfected and its superiority proved on Diesel engines and finally on the 1948 Packard 8 and DeLuxe 8.

And the story of DC Silicone Fluids as damping media has just begun. We have learned from this and many similar experiences that equally useful applications of the basically different Dow Corning Silicone products may require an equal amount of developmental time. It's none too early to investigate their potential advantages. DC Silicone Resins, Varnishes, Fluids, Lubricants and Silastic* are described in Catalog M 1-17, available from Midland or nearest branch office.

*TRADEMARK FOR DOW CORNING SILICONE RUBBER

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FIRST IN SILICONES

Business in Brief

Written by the Guarantee Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

Narrow fluctations in general business activity are indicated. The *New York Times* index for the week ended July 24 stands at 149.3, as against 152.5 for the preceding week and 144.4 a year ago.

Sales of department stores during the week ended July 24, as reported by the Federal Reserve Board, equaled 231 per cent of the 1935-39 average, as compared with 236 in the week before. Sales were nine per cent above the corresponding distribution a year earlier, as against a preceding similar excess of seven per cent. The total in 1948 so far reported is seven per cent greater than the comparable sum in 1947.

Electric power production increased slightly in the week ended July 24. The output was 12.9 per cent above the corresponding amount in 1947, as compared with a similar advance of 9.8 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 882,566 cars, 1.1 per cent less than the figure for the week before and 4.1 per cent below the corresponding number recorded in 1947.

Crude oil production in the week ended July 24 averaged 5,447,800 bbl daily, 3350 barrels more than the preceding average and 364,150 bbl above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended July 24 is estimated at 12,130,000 net tons, two per cent more than the comparable amount a year ago. The total production in 1948 so far reported is 6.9 per cent below the corresponding quantity in 1947.

Civil engineering construction volume reported for the week ended July 29, according to *Engineering News-Record*, is $114,276,000, or 20 per cent less than the preceding weekly figure but 13 per cent above the comparable sum in 1947. The total recorded for 31 weeks of this year is 27 per cent more than the corresponding amount in 1947. Private construction is 10 per cent above that a year ago, and public construction has increased by 47 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended July 24 stands at 168.2 per cent of the 1926 average, as compared with 150.6 a year ago.

Member bank reserve balances increased $31 million during the week ended July 28. Underlying changes thus reflected include a decline of $165 million in Reserve bank credit and a decrease of $57 million in Treasury deposits with Federal Reserve banks, accompanied by a reduction of $43 million in money in circulation.

Total loans and investments of reporting member banks increased $318 million during the week ended July 21. An advance of $21 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, $14,502 million, shows a net increase of $2,553 million in 12 months.

"So you think oil is oil..." ...says "CHIP" WRIGHT

"...Might be if you have become deadened to production headaches. Personally, I've found cutting fluids are a major factor in operating a modern metal working plant. They can make or break most jobs. And that's not hard to understand when you consider all the variables involved. Speeds, feeds, materials, tolerance and finish requirements all influence the application of a cutting fluid. Oil that is 'just oil' simply cannot give you the performance you need. Fortunately, it is a problem that can be satisfactorily solved by *qualified* cutting oil people. It's their full-time business. They have the experience plus the facilities that no individual user can match. I've learned that it pays to take advantage, not only of their tested products, but of their experience and service as well."

Chip

Since 1865, D. A. Stuart Oil Company has devoted its entire interest to Cutting Fluids and Industrial Lubrication. This experience, plus the facilities of one of the finest laboratories in the industry, are available to help you get the most out of cutting fluids. Be sure to get Stuart's handbook, "Cutting Fluids for Better Machining."

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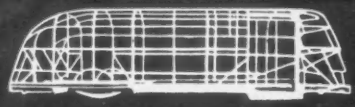
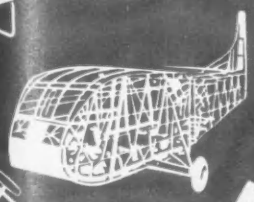
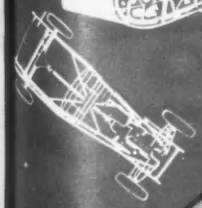
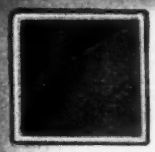
LIGHT WEIGHT · UNIFORM STRENGTH · ECONOMICAL · MACHINE-ABILITY







1/4" to 4" O. D. 9 to 22 gauge



SQUARE

1/2" to 2" 20 gauge —1" to 2¾" 14, 16, 18 gauge

RECTANGULAR

1/2" to 2" 20 gauge—1" to 2¾" 14, 16, 18 gauge

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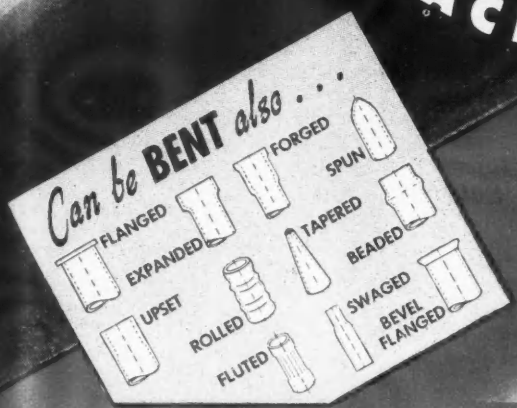

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Write for Descriptive Bulletin

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

General News

(*Continued from page* 64)

ney Div., United Aircraft Corp.; GM's Allison Div.; the General Electric Co.; and Wright Aeronautical Corp.

Chrysler Nets $35 Million In First Six Months

The Chrysler Corp.'s net earnings for the first six months of 1948 were $35,786,011 as compared with $36,122,457, for the same period in 1947. Dollar sales of all products, including automobiles, trucks, parts, accessories and miscellaneous items during the first half of 1948 amounted to $662,812,815 as compared with $648,680,637 for the first half of 1947. Chrysler's unit sales of passenger cars and trucks for the first six months of 1948 were 439,159 vehicles as compared with 460,252 for the same period of 1947.

1949 Nash Model Engine to Have New Type Piston

The engine on the 1949 Nash 600 will have a four-ring piston of new design. Nash abandoned the three-ring piston last April in favor of four-rings, but pistons in the new model will be of different design. Connecting rod will be shorter and piston longer to accommodate the four-rings.

Lincoln-Mercury Purchasing To Total $250 Mililon

Purchasing activities of Ford's Lincoln-Mercury Div. are being expanded and when the program is completed, annual purchases by the division will total $250 million a year, triple the present volume. Under the new setup the L-M purchasing department is being separated completely from Ford operations. General purchasing agent is Herbert H. Foster, who was recently appointed to succeed the late George W. Walker.

Hudson Second Quarter Net Up Half Million

The Hudson Motor Car Co. reports consolidated net income for the second quarter of this year of $2,581,328, compared with $2,005,041 for the corresponding period of last year.

Automobile Repair Parts Trend Upward in Price

Repair parts prices are on the upgrade. Packard has revised its parts prices selectively with the average increase running five to six per cent. Hudson is also increasing parts

(*Turn to page* 98, *please*)

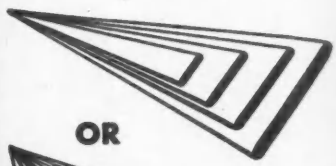
PAGE

Stainless Steel

WIRE

ROUND

FLAT



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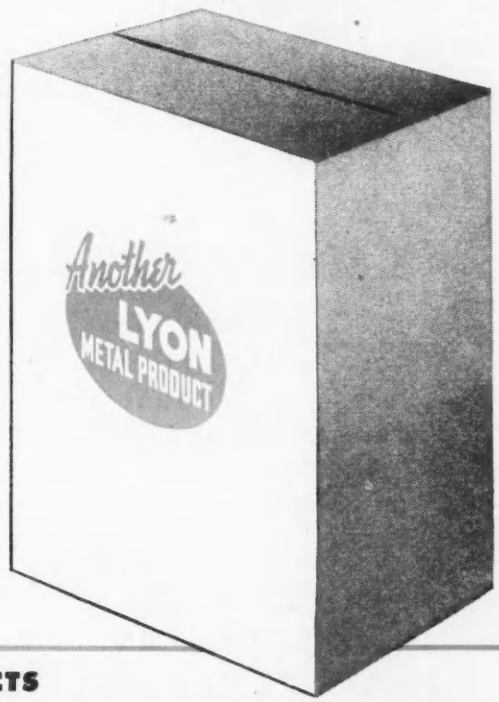

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- Storage Cabinets
- Bench Drawers
- Work Benches
- Drawer Units
- Conveyors
- Shop Boxes
- Bar Racks
- Bin Units
- Tool Stands
- Service Carts
- Hopper Bins
- Parts Cases
- Flat Drawer Files
- Tool Trays
- Desks
- Stools
- Tool Boxes
- Sorting Files
- Ironing Tables

General News

(*Continued from page* 96)

prices about the same amount. Nash and Kaiser-Frazer are expected to raise parts prices after new models are announced.

Mercury Changed Slightly for Rear Seat Leg Room

It is reported that slight modifications will be made in the 1949 Mercury to improve leg room in the back seat. The alterations are said to include changing position of or eliminating the foot rest and moving the rear seat back an inch or so.

New Engineering Building Going Up At Chrysler

The Chrysler Corp. is building a three-story modern engineering building at its Highland Park plant. Plans show the building to be 200 by 60 ft.

Car and Truck Exports Fall Below 1947 Level

Export of passenger cars from the United States during the first five months of this year dropped 12 per cent and truck exports declined 23 per cent. Continuing restrictions by foreign countries on the import of American-made vehicles pose a potentially serious problem to the industry with South Africa, Venezuela, and Switzerland the only three countries still allowing unrestricted imports.

Ford Pays $1500 Maximum for Employe Suggestion

The Ford employe suggestions system is a year old this month and has proved highly successful thus far. The highest award made under the plan was made recently to a job setter for his suggestion providing for the use of a limit switch and the extension of the locking pin on the camshaft and crankshaft lathe. He received $1500, which is the top amount provided under the suggestion system. The use of the suggestion has eliminated damage to the machine heads and cutters and block scrappage that formerly resulted if the locking pin on the machine table was not properly inserted. Under the plan the employe gets 100 per cent of the cost savings resulting from a suggestion for the first two months up to the $1500 maximum. Under the system a total of $17,959 was paid to employes during the first six months of this year. The average award was $48.94, compared with $18.16 average for all industry. Thirty-two per cent of all suggestions received have been adopted, as compared with 24.8 per cent for the national average of such plants. Many of the suggestions do not result in savings to the company, but are aimed at eliminating hazards or bettering working conditions.

Roger M. Kyes Joins GM Staff

Roger M. Kyes, former president and general manager of Harry Ferguson, Inc., has joined GM's executive staff. He will work on special assignments reporting directly to C. E. Wilson, president. He left Ferguson last November.

Studebaker Appoints Usner As Aide to V.P.

Edward L. Usner has been made assistant to P. O. Peterson vice president in charge of manufacturing for Studebaker Corp.

Carl F. Wilkening

Carl F. Wilkening, 72, founder and president, Motor Parts Co., and an organizer and vice president, Wilkening Mfg. Co. died in Philadelphia on July 29.

YA

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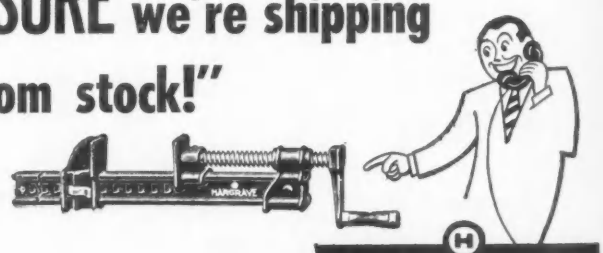
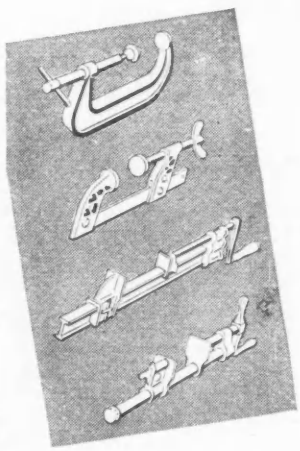
"SURE we're shipping from stock!"



HARGRAVE
"I" BAR CLAMPS
(Patented)



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